Proposal # 2001- G-207 (Official Use Only)

A. PSP Cover Sheet

Proposal Title: *"Sustaining Agriculture and Wildlife Beyond the Riparian Corridor"*
Applicant Name: *Yolo County Resource Conservation District*
Contact Name: *Katy Pye*
Mailing Address: *221 W. Court St. #1 Woodland, CA. 95695*
Telephone: *530-662-2037 ext. 3*
Fax: *530-662-4876*
Email: rcdnatives@hotmail.com or topquail@yolorcd.ca.gov

Amount of funding requested: **$1,464,167**
Some entities charge different costs dependent on the source of funds. If it is different for state or federal funds, list below:

State cost: Federal cost:
Overhead rates are the same to both state and federal funders – 10%

Cost-share partners **X** Yes **___ No**

Farmers and Ranchers: yet unknown in-kind services, consulting, equipment	$ 60,000
CALFED-Bay Delta Grant (Grant #98-E13)	$ 164,480
USDA-ARS in-kind services, supplies, and equipment	$ 549,000
Yolo County Flood Control and Water Conservation District	$ 35,000
UC Davis Information Center for the Environment:	$ 4,800
UC Davis Center for Integrated Watershed Science and Management:	$ 1,000
USDA: Natural Resources Conservation Service (Finney & USDA cost-share programs):	$ 418,000
RCD Board- Committee and individual consultations:	$ 198,000
UCCE: Rachael Long, Gene Miyao, David Kelly - consultation	$ 11,000
Other UC researchers, private industry consultants and agency Support – unquantifiable at this time. Expecting to draw on Agronomy and Range Science	
*(**Ken** Tate) Audubon-National and CA offices, State Water Board, USF&WS-Partners **for** Wildlife Program:*	$ 30,000
Idaho One Plan	$ 850,000
*Previous and present related supportive projects, cost-share, in-kind service (**see** Relationship To Other Ecosystem Restoration Projects for details)*	$2,050,000
Minimum total cost-share:	$4,343,280

Indicate the Topic for which you are applying (check **only** one **box**).

- Natural Flow Regimes
- Nonnative Invasive Species
- Channel Dynamics and Sediment
- Flood Management
- Shallow Water Tidal/Marsh Habitat
- Contaminants
- ■ Beyond the Riparian Corridor
- Local Watershed Stewardship
- Environmental Education
- Special Status Species Surveys and Studies
- Fishery Monitoring, Assessment and Research
- Fish Screens

What county or counties is the project located in? *Yolo County*

What **CALFED** ecozone is the project located in? See attached list and indicate number. Be specific as possible.

ERPP Ecozone 10.4—Yo10 Basin; Willow Slough Watershed

Indicate the type of applicant: *Local Government/district*

Indicate the primary species which the proposal addresses (check all that apply)

- ☐ San Joaquin & East-side Delta Trib. Fall-run chinook salmon
- ☐ Winter-run chinook salmon
- ☐ Late-fall run chinook salmon
- ☐ Splittail
- ☐ Green strugeon
- ☐ White sturgeon
- ☐ Spring-run chinook salmon
- ☐ Fall-run chinook salmon
- ☐ Waterfowl and Shorebirds
- ☐ Migratory birds
- ☐ Longfin smelt
- ☐ Steelhead trout
- ☐ Striped Bass
- ☐ All chinook salmon species
- ☐ All anadromous salmonids
- ☐ American shad
- ☐ Other listed TIE species: VELB, Swainsons Hawk, California Tiger Salamander, Western spadefooi toad, Western pond turtle

Indicate the type of project: *Pilot/Demonstration*

Is this the next phase of an ongoing project? ***Yes***

Have you ever received funding from **CALFED** before? *No (We were the named partner with Audubon Society-CA on CALFED project # 98-EI3. Audubon was the contracting entity.)*

Have you received funding from **CWIA** before? *No*

By signing below, the applicant declares the following:

- The truthfulness of all representations in their proposal;
- The individual signing the form is entitled to submit the application **on** behalf of the applicant (if the applicant is an entity **or** organization); and
- The person submitting the application has read and understood the conflict of interest and confidentiality discussion **in** the **PSP** (Section **2.4)** and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, the extent provided in the Section.

KATY PYE

Print name of applicant

Signature of Applicant

B. **EXECUTIVE SUMMARY**

"Sustaining Agriculture and Wildlife Beyond the Riparian Corridor"

Yolo County Resource Conservation District 221 W. Court St. #1 Woodland CA 95695 530-662-2037 ext. 3 530-662-4876 FAX; rcdnatives@,hotmail.com.Contact: Katy Pye

AMOUNT REQUESTED: $1,464,176 **MATCH: $4,343,280**

CALFED Goals: #1s and 3 At-risk species and Harvestable species, #4 Habitats, #5: Non-native Invasive Species (NIS), #6 Sediment & Water Quality.

CALFED Uncertainties: # 6 NIS, #6 Channel Dynamic, Sediment Transport, & Riparian Vegetation; #12: Beyond the Riparian Corridor

LOCATION: ERPP Ecozone 10.4—Yolo Basin-Willow Slough Watershed. Coordinates: Northwest comer: 1228 05' 00" W, 388 39' 00" N; Southwest comer: 1228 06' 00" W, 388 36' 00" N; Northeast comer: 1218 49' 30" W, 388 37' 00" N; Southeast comer: 1218 49' 30" W, 388 35' 30" N; Approx. center point: 1218 57' 45" W, 388 35' 30" N

TYPE PROJECT: Pilot and Demonstration – "Beyond the Riparian Corridor"

OBJECTIVES:

1. Develop compressed protocols to assess watershed function and prioritize conservation work;
2. Conduct on-farm demonstration projects and research of a discrete set of agricultural conservation solutions;
3. Quantify the effects of the practices through replicated, multi-year trials and monitoring of these projects;
4. Develop a web-based landowner conservation decision assistance tool (Yolo OnePlan) to facilitate small scale, private conservation planning for large-scale watershed improvements; and
5. Increase landowner participation as a result of a strong education and outreach program and the "landowner service" to provide technical assistance, economic incentives.

HYPOTHESES:

1. Gathering and assessment of watershed-wide and site-specific data is needed to understand watershed function and to set priorities for conservation and restoration.
2. Techniques for protecting soil and water quality and wildlife habitat (cover crops, conservation tillage, tailwater ponds, sediment traps, hedgerow stream buffers, and canal and stream bank vegetation) can be implemented on local farms for demonstration and scientific study. These practices can significantly improve water quality moving off farms into Delta tributaries and harbor important wildlife species for the region.
3. A web-based conservation planning tool (OnePlan) that provides decision assistance on the effects of conservation projects will facilitate and expedite private landowner conservation efforts.
4. Outreach activities, a landowner support service, new information about the above conservation practices and the OnePlan will increase landowner adoption of conservation techniques.

APPROACH: Assess watershed conditions and install demonstration sites to test the efficacy of agricultural conservation practices, primarily for water quality and wildlife benefits. Adjust practice protocols based on data analysis. Design and test web-based conservation tool with local landowners and give them technical and financial incentives to begin implementation. Provide a strong education and outreach program to increase numbers of watershed stewards who will ultimately improve watershed and Bay-Delta function.

EXPECTED OUTCOMES: 1) a working assessment of the Union School Slough Watershed and plan directing future watershed work; **2)** installed conservation sites with functional data on 2 cover crop sites, 1 conservation tillage site, 5 tailwater ponds, 5 farm-drain sediment traps, and 5 hedgerow buffer corridors; **3)** Quantified and published results of water quality and wildlife habitat benefits of all practices, including those along canal and stream banks; **4)** a beta-stage conservation planning-assistance tool (Oneplan) for Yolo County and 3-6 landowner plans generated by the growers; and ***5)*** a highly directed project outreach program. All these products are expected to lead to more resource and habitat conservation activities both in the watershed, but throughout the county and Bay-Delta region.

C. Project Description

1. a. Statement of the Problem

The CALFED PSP identifies a new uncertainty, "Beyond the Riparian Comdor" (BRC) addressing the highly complex world of industry, natural resources, human interaction, wildlife species and habitats. A decade of field work by the Yolo County Resource Conservation District (RCD), farmer-to-farmer and farmer-to-agency, has taught us both the complexities and the most sustainable solutions to local and regional resource problems. While we have some hard data, substantial anecdotal information, and a set of refined practices, not enough critical variables are yet understood, let alone cataloged within reliable experimental models. A set of focused scientific data pilot and demo projects will increase landowner buy-in and thus produce widespread, positive environmental improvements.

Clearly, to improve water quality and wildlife conditions in the Bay-Delta plan area, CALFED must welcome agriculture as an *active partner*. Widespread industry commitment to solve Bay-Delta problems will occur when farmers and ranchers embrace a strategic "package" of financial and regulatory incentives, scientific and economic data, proven practices, education, and predictable, positive reinforcement. This proposal focuses exactly on refining this watershed conservation "package" so that the right information and solutions to water quality, habitat and wildlife, and agronomic/project development problems get to the right people in the most persuasive, respectful format. What answers to CALFED uncertainties must equally answer the needs of farmers, agencies, partners, wildlife, and conservation of natural resources.

Yolo County's 1996 Willow Slough Watershed Integrated Resources Management Plan (WSP) identifies three categories of natural resource problems within this 131,000 acre watershed, specifically: 1) loss of bio-diversity and quality wildlife habitat resulting from conventional land management practices in irrigated agriculture and ranching, 2) degradation of water quality through sediment and nutrient loading, and *3)* the subsequent regional threats to agricultural sustainability. These problems reappear in the CALFED Ecosystem Restoration Program Plan, identifying Willow Slough Watershed (WSW) as an important contributor to the health of the Yolo Basin Ecological Unit and the Bay-Delta ecosystem (ERPP, Vol. II, pp. 317-337).

In 1999, Audubon-California and the Yolo RCD received CALFED funding for a joint project on a sub-watershed in the WSP. The Union School Slough Watershed Improvement Program (USSWIP) is well underway. Previous RCD work with landowners and agencies, and first year results from the USSWIP, demonstrate the need to built on our efforts. In submitting separate "next phase" proposals (for fiscal purposes), Yolo RCD presents a workplan for tasks on Union School Slough's lower watershed, while Audubon proposes to address rangeland management throughout the WSP plan area. A new on-farm research project with USDA:Agricultural Research Service (ARS) and development of a landowner decision-making tool further integrate resource management data and tools to support local, voluntary landowner conservation and enhancement projects.

Historically, a series of RCD collaborative projects with local farmers, ranchers, and agencies produced encouraging if partial data about best integrating farming practices with wildlife habitat benefits. Therefore, the RCD proposal addresses the following objectives: to use Union School Slough to develop a compressed set of scientifically viable watershed assessment protocols and; to confirm the viability of watershed improvement recommendations (for water quality and wildlife) through *more* in-depth scientific analysis of existing remedial practices and demonstrations; and to increase landowner awareness and participation in implementing watershed restoration. Ultimately, the results of this project will support full adaptation and implementation of the WSP with management practices over vast acreage during the next 20 years. It will also provide effective models for partnering with agriculture, the largest resource user in the Bay Delta system.

Effectively solving many watershed-level problems outside the riparian corridor requires a series of steps. The first being watershed assessment. Because of the complex, time-consuming, and costly nature ofwatershed restoration and enhancement, many efforts never get off the ground or sustain themselves. The RCD project will evaluate what minimum documented conditions and key methodologies are necessary to produce scientifically viable yet simplified assessments. This is an extension of activities conducted under both the WSP and USSWIP, adding new data on soil losses (volume and source), nutrient loading, and Non-native invasive species (NIS) and beneficial habitat mapping, to complete the sub-watershed picture for USS and to direct future work in the watershed. Working with willing, local landowners, Audubon-CA staff, USDA:NRCS, USDA:ARS, Yolo County Ag Commissioner, and UC Davis' Center for Integrated Watershed Science and Management, we aim to develop a reduced-scale watershed assessment design, transportable to similar-sized watersheds in the Bay Delta project region.

Second, reducing sediment and nutrient loading while increasing habitat and biodiversity in the system require a set of practices, which are economically and logistically viable to the farmer and rancher. The RCD has developed, tested, and documented *(Attachement I* Bring Farm Edges Back to Life and *Attachment* 2 RCD web page – www.yolorcd.ca.gov) such working conservation and enhancement practices (irrigation tailwater and wildlife hill ponds, canal and roadside revegetation, cover crops, and native species hedgerows). We also propose a pilot concept to answer both RCD and CALFED riparian objectives and concerns (PSP pp.42), CALFED seeks to reduce major stream alterations to achieve habitat and floodplain benefits, while limiting third-party impacts. We intend to design and test a suite of hedgerow buffer corridors (HBC) to serve as "smaller-scale" replacement options for the more costly, regulatory and meander constricting stream corridor restoration. Planting distances from channels will vary and soils and water tables will be monitored and compared (PSP p.42). This system produces no negative third-party impacts and likely reduces or eliminates permitting headaches. Comprehensive monitoring and analysis of all practices will ensure practice viability for both the farmer or rancher and CALFED's goals.

Third, large-scale adoption of systematic watershed and environmental enhancement and restoration strategies require documentation, institutionalization, and access to the assessment, monitoring, and implementation information, across all efforts. As a result of our working closely with a consortium of local landowners, agencies in Idaho, USDA:ARS, USDA:NRCS, and UC Davis – Information Center for the Environment (I.C.E.), CALFED funding would facilitate transfer of a web-based farming and conservation planning tool to the RCD to become a pilot (Yolo OnePlan) for the state *(Attachment 3 Idaho Oneplan)*.

The OnePlan would give farmers, ranchers, and agencies local and area-specific resource information to develop individual plans for individual farming operations, within a specific watershed setting. The OnePlan tool begins with a close-up of each farm or sub-watershed through downloadable, interactive mapping layers. While Yolo County is the prototype site for California, considerable development costs have already been borne by the Idaho project and USDA ***(see*** *Cover Sheet)*.

Lastly, CALFED, the RCD, and Audubon-CA are dedicated to wide promotion of our successful projects. We have established expertise in transferring models and practices to many other watersheds, having often collaborated with a set of outreach partners – Audubon-CA, USDA, UCD, UCCE, Community Alliance For Family Farmers (CAFF). We will rely heavily on our "Landowner Service under the USSWIP, local workshops, and our web site to disseminate project results.

b. Conceptual Model: Two guiding concepts focus the RCD's current work under the WSP: 1) that interactions between agricultural and watershed systems suffer from overlapping resource problems for which solutions exist but which require further testing, and 2) broad adoption of resource and watershed enhancement objectives requires active involvement of farmers and ranchers linked both to and beyond the riparian corridor. These basic concepts define our "conceptual model" for watershed improvements that will make a difference on private agricultural land in the Central Valley. The following hypotheses will demonstrate the role agriculture

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Cost-share partners X Yes ___ **No**

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What county or counties is the project located in? *Yolo County*

What CALFED ecozone is the project located in? See attached **list** and indicate number. Be specific as possible.

ERPP Ecozone 10.4—Yo10 Basin; Willow Slough Watershed

Indicate the type of applicant: *Local Government/district*

can play in improving watershed health and the best means by which farmers and ranchers can be engaged as partners in the process. In partnership with Audubon-CA's current and proposed efforts, the RCD aims meet the following objectives through this proposal:

1. Develop compressed protocols to assess watershed function and prioritize conservation work;
2. Conduct on-farm demonstration projects and research of a discrete set of agricultural conservation solutions;
3. Quantify the effects of the practices through replicated, multi-year trials and monitoring of these projects;
4. Develop a web-based landowner conservation decision assistance tool (Yolo OnePlan) to facilitate small scale, private conservation planning for large-scale watershed improvements; and
5. Increase landowner participation as a result of a strong education and outreach program and the "landowner service'' to provide technical assistance, economic incentives.

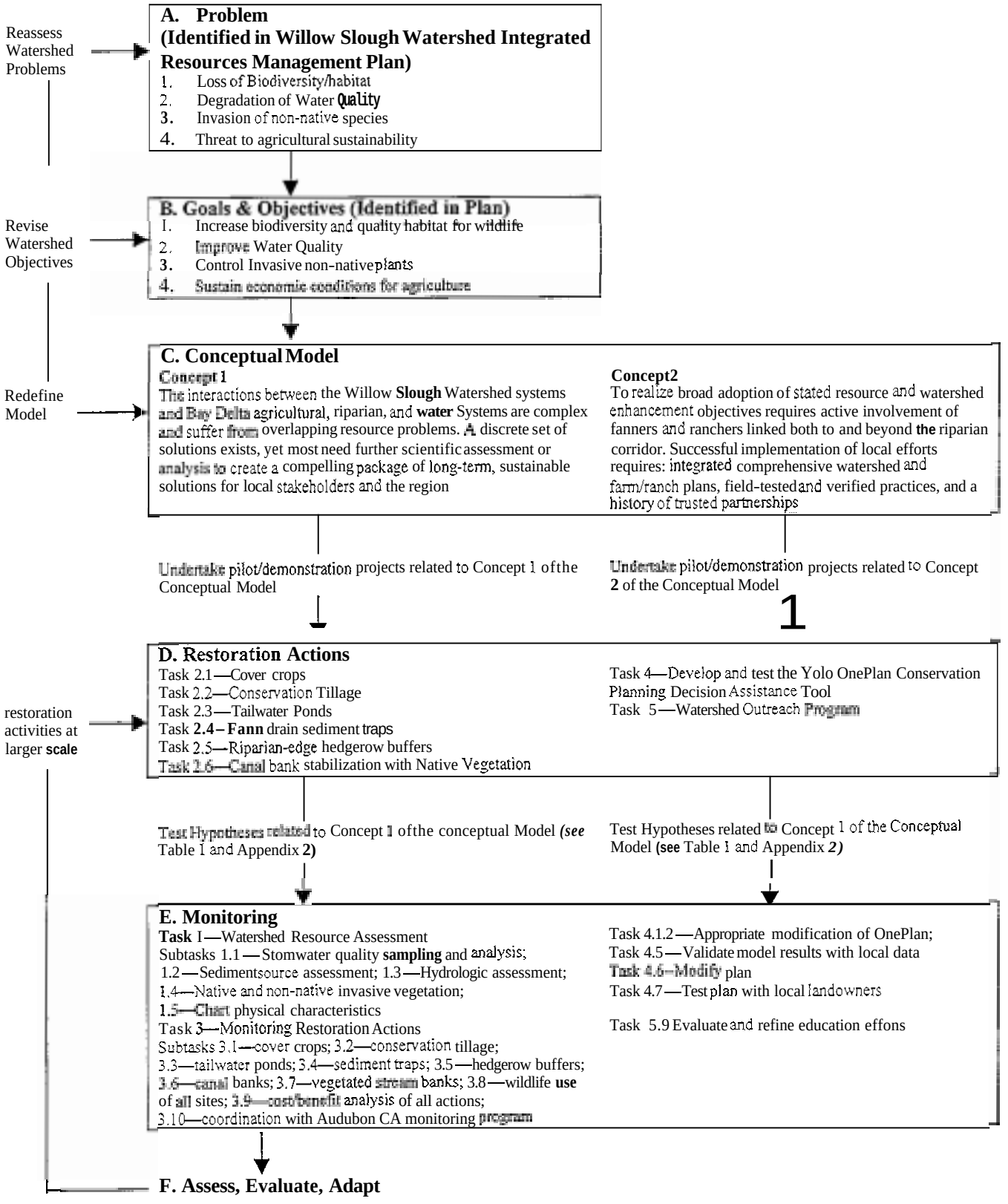
c. Hypotheses being tested: Related to these objectives are hypotheses which the RCD will test. These hypotheses, the data needed to test them, and their general relationship to the Goals and Uncertainties stated in the CALFED ERPP are summarized in the *Table I* below. A more detailed table is attached as *Appendix 2*

Table I

Hypotheses	5. Gathering and assessment of watershed-wide and site-specific data is needed to develop a clear picture of watershed function and priorities for conservation and restoration. 6. Techniques for protecting soil and water quality and wildlife habitat (namely, cover crops, conservation tillage, tailwater ponds, sediment traps, hedgerow stream buffers, and canal and stream bank vegetation) can be implemented on local farms for demonstration and study purposes. These practices can significantly improve water quality moving off farms into Delta tributaries and harbor important wildlife species in the region. 7. A web-based conservation planning tool that provides decision assistance regarding the effects of conservation projects will facilitate private conservation efforts. 8. Outreach activities, a landowner support service, new information about *the* above conservation practices and the OnePlan will increase landowner adoption of conservation techniques.
Data needed	1. Hydrology, storm water quality, sediment sources, native and non-native invasive species populations along with compilation of climate, soil, and land use changes. 2. Runoff volume and nutrient & sediment content from ponds, traps and field management techniques (cover crops and conservation tillage) contrasted with controls/conventional techniques; wildlife use of vegetated project sites contrasted with paired control sites; water table depths, plant/soil/water remedial system combinations; NIS management techniques using native species, and NIS re-invasion post-remediation. 3. Testing with landowners upon completion of tool. 4. Surveys pre- and post-project as well as at outreach events of landowner interests for project planning and implementation.
Improved knowledge	Scientific basis for outreach, design, and implementation of remedial practices affecting farming and wildlife habitat as linked systems, beyond the riparian corridor.
CALFED Goal or Uncertainty	Uncertainties: # 6 NIS, #6 Channel Dynamic, Sediment Transport, & Riparian Vegetation; #12: Beyond the riparian corridor Goals: #1: At-risk ssp, G#3: Harvestable species, *X4* Habitats, *X5:* NIS, #6 Sediment & Water Quality

d. Adaptive Management : The Willow Slough Watershed Plan and USSWIP exemplify an adaptive management process. In the plan development process, local landowners and stakeholders met to identify those watershed problems and establish goals and objectives that speak to their issues. The above conceptual model is a result of that process and the RCD's years of experience working with local landowners and consulting with regional experts (USDA NRCS and UC Cooperative Extension especially) to deal with those landowners' resource concerns. From our experience developing on-farm wildlife and water quality conservation techniques we have identified a set of practices that specifically addresses Goals and Uncertainties expressed in the CALFED Ecosystem Restoration Program Plan. As per the Adaptive Management Process diagramed on p.15 of the PSP, we are prepared to initiate restoration actions. ***(Figure** I: Adaptive Management Process follows)*

Figure 1
Union School Slough Watershed Improvement Program
Organization and Adaptive Management Process



This proposal blends Pilot and Demonstration projects and closely monitors for their efficacy. The proposed ARS-supported work provides research on cover crops, conservation tillage and two tailwater ponds. Supported by key agencies, these practices show convincing results, yet we need to quantify their impacts on water quality and wildlife for California's resource and agricultural systems. Without such information, we are greatly limited in our ability to persuade landowners and agencies to install better on-farm water quality and wildlife conservation solutions for large-scale restoration. Further, without such information, we cannot see their physical impacts closely enough to make the appropriate changes or adjustments that any adaptive management process demands.

Making the Oneplan work in Yolo County means incorporating other USDA decision assistance tools and the data gathered on the project sites so that it becomes a relevant, effective device for facilitating farmer and rancher watershed stewardship. Subject to the same adaptive management process mentioned above, this pilot tool will be thoroughly tested, refined, and modified by the feedback of our team of local landowner, agency,' and academic partners.

***e*. Educational Objectives:** The overall objective is to formalize our Education and Outreach program and extend its reach. Audubon will be an important partner in the Education and Outreach program. Specific objectives include:

1) To produce informed and technically-armed landowner stewards whose actions increase viable habitats for species of concern to CALFED; **2) To make all project practices transferable,** if not the specific environmental variables, then certainly the concepts and steps relevant to other locales; **3) Wide distribution of project information** through a variety of outlets: quarterly newsletters to 1000+ local USDA/RCD cooperators, the RCD web site (with a task to target other CALFED projects), periodicals and journals, press releases, brochures, event displays, Fair Booth, Colusa Farm Show, and Duck Days; **4) To continue our existing series of farming-for-wildlife workshops** covering all the practices addressed in the proposal. Our goal is to increase current average draw of 40+ core landowners for each event. Target outreach audiences will include farmers, ranchers, rural landowners, agency staff, pest control advisors, students, and the general public. Speakers will range from scientists and planners to agency experts. Landowner speakers bring their first-hand experiences to share: the best proven way to get farmers to change behaviors; **5) To provide hands-on programs** at every opportunity; ***6)*** **To regularly and variously evaluate our Education and Outreach activities** through simple event surveys, a questionnaire on our web site, and farmer surveys of practices, both at the initiation and conclusion of the project period.

2. Proposed Scope of Work:

a. Location –The Union School Slough Watershed is a sub-watershed of the Willow Slough Watershed in Yolo County, California in ERPP Ecozone 10.4 – Yo10 Basin; Willow Slough. A 1:250,000 scale USGS quad map with comer points and centroid coordinates is attached as *Attachment 4.*

b. Approach

The primary tasks for the proposed scope of work are outlined and annotated below with their respective subtasks tabulated beneath them with approximate start and end dates, assuming project work can be initiated in spring 2001. Specific information on sampling technique and analysis is included in the following section, 2.c. Monitoring & Assessment Plans. Monitoring and assessment, essential elements of this proposal, are included in the tasks below under Task3.

c. Monitoring and Assessment Plans *(Appendices 1 & 3: ARS* ***Farmland Workplan for Tasks*** *1, 2, & 4 and* ***Monitoring*** *Protocols* ***Task 3)***

Task 1: Assess watershed function and problem sources

Emphasis is on development of a simple baseline study of the watershed to 1) determine priorities for a comprehensive watershed improvement program (eventual Large Scale Restoration), 2) populate the Yolo OnePlan conservation decision-assistance tool with watershed data and **3)** provide a baseline for assessing conservation activities contribution to improving watershed conditions (e.g. water quality and wildlife).

Deliverables: 1) A model streamlined watershed monitoring protocol, 2) Report on the state of the watershed including: hydrologic function, sediment movement and sources, and native and non-native vegetation populations; and 3) An adaptable long-term improvement plan for the Union School Slough Watershed.

Subtask	Description	Start	End
1.1	Storm and irrigation event water sampling with ISCO samplers at five ore-selected sites along the slough (20 miles) across different hill slope and valley floor geomorphic and land management conditions for nutrient and sediment analysis. Information will be input into USDA AgNPS (Ag Non-Point Source) Model to generate watershed sediment budget extendible to the entire Willow Slough Watershed	Summer 2001	Fall 2003
1.2	Visual assessment of watershed sediment sources (using UC Cooperative Extension ***Range Sediment Delivery Estimation techniaue*** *and* ***Davis High School students*** in upper watershed ***(Attachment IO).***	Summer 2001	Spring 2002
1.3	Complete the hydrologic assessment of Union School Slough initiated in USSWIP	Spring 2001	Spring 2002
1.4	Chart significant populations of non-native invasive and native beneficial plant species in the watershed.	Spring 2001	Spring 2002
1.5	Chart basic physical characteristics of the watershed from existing maps and surveys—namely, soil characteristics, historic land use changes, and climate history	Winter 2001	Spring 2002
1.6	Incorporate information into report and develop watershed USS plan, with Audubon staff	Spring 2002	Spring 2004

Task 2: **Demonstration project implementation**

Establish demonstration sites within the USS watershed that will double as monitoring sites for the practices we have identified as critical to watershed health and CALFED priorities.

Deliverables: Selected conservation practices installed on local farms as per the outlined subtasks

2.1	Establish two winter cover crop sites (paired with conventional treatments) to be intensively monitored for associated water quality improvements. ***Monitoring devices already in place*** *on* ***one site*** *and* ***begun under partnership with USDA:ARS.***	Spring 2001	Fall 2003
2.2	Establish one row-crop conservation tillage (paired w/ conventional tillage) site for similar analysis. ***Monitoring devices already in place and begun under partnership with USDA:ARS.***	Spring 2001	Fall 2003
2.3	Establish four 2-stage tailwater ponds for evaluation of sediment and nutrient capture in irrigation tailwater and winter runoff. *To* ***be constructed under current*** *USSWIP funding.*	Summer 1999	Fall 2002
2.4	Establish five sediment traps at farm ditch drainage points into Union School Slough and tributaries.	Summer 2001	Winter 2001
2.5	Plan and establish five 1000 ft. riparian-edge (interface) hedgerow buffers along Union School Slough (removal of NIS if necessary). Establish site baseline conditions, design hedgerow systems, install piesometers.	Summer 2001	Spring 2003
2.6	Select five paired canal bank "reaches" (bare vs. revegetated) for monitoring bank stability. One will be established through the current USSWIP and other adequate examples exist in the watershed for the purposes of this study.	Spring 2001	Spring 2001

Task 3: Monitoring conservation effects

Quantify effects of conservation practices on wildlife, habitats, and soil and water physical, chemical parameters, and biological factors. Subtasks 3.1 – 3.3 will be lead by Steve Griffith, USDA:ARS

Deliverables: Analysis of results to be included in final report and communicated through publications and field meetings, and used to populate the OnePlan with data. (Appendix 4: Monitoring Citations)

3.1	Analyze effect of winter cover crop on winter runoff (nutrients, sediment and volume) and crop nutrient efficiency contrasted with winter fallowing for 2 years.	Fall 2001	Fall 2003
3.2	Analyze the effect of conservation versus conventionally tilled ground on winter runoff (nutrients, sediment and volume) and crop nutrient efficiency for 2 years.	Spring 2001	Fall 2003
3.3	Measure and analyze sediment capture and suspended sediment and nutrients of water entering and exiting constructed 2-stage tailwater ponds for 2 years.	Summer 2001	Fall 2003
3.4	Measure and analyze trap sediment capture and suspended sediment and nutrient measurements of water entering and exiting constructed sediment traps for 2 years.	Spring 2001	Winter 2003
3.5	Monitor and analyze hedgerow buffer/streambank sites for *riparian-edge habitat, water levels, and plant species site-specificity.*, weed control, and native vegetation establishment.	Fall 2001	Spring 2004
3.6	Select, monitor and analyze relative stability of 5-10 sets of paired canal banks (bare vs. armored with native vegetation) using bank-slip size categorization and counts.	Summer 2001	Fall 2003
3.7	Monitor habitat quality condition and change in bank stability in 5-10 paired reaches (bare vs. revegetated with natives) along Union School Slough	Summer 2001	Fall 2003
3.8	Monitor and analyze wildlife use of all paired, vegetated project sites. Non-paired sites will be surveyed. (Five pre-existing, established hedgerow sites will be surveyed for bird nesting, other wildlife use, and crop pest insect use.)	Summer 2001	Fall 2003
3.9	Collect cost information and conduct cost/benefit analysis of implementing and managing lower watershed conservation practices.	Spring 2002	Fall 2003
3.10	Coordinate data analysis and reporting for watershed monitoring activities with Audubon and the USSWIP and Willow Slough Rangeland Stewardship Program	Spring 2001	Spring 2004

Task 4: Development of the Yolo OnePlan Conservation Planning Tool and Economic/Environmental Impact Assessment of Union School Slough Watershed Farming Practices. The OnePlan is to be a World Wide Web-based Conservation Decision-Assistance Tool modeled after the Idaho OnePlan, but designed for application in California with assistance from USDA: ARS, Oregon State University, NRCS California, and Idaho NRCS and EPA. Additional input will come from UCD's I.C.E. program, Audubon-CA, and watershed landowners.

Deliverable: Development team, including landowners, agencies, UCD Center for Integrated Watershed Science and Management ICE. Pilot Yolo OnePlan populated with basic local resource information, conditions and solutions to targeted problem. Tested by the team, revised as needed, and uploaded to the Yolo RCD website.

4.1	Prepare USDA-ARS specific cooperative research agreement with Computer Science Department, Oregon State University to produce Yolo OnePlan Conservation Planning Tool and deliver to the world wide web.	Spring 2001	Winter 2004
4.1.1	Develop OnePlan concept framework, prescribe end product requirement, analysis of existing system economic and conservation impact assessment components compatibility, integration design strategies, architecture for integrating system components, incremental programming and beta testing.	Spring 2001	Spring 2003
4.1.2	Appropriate modification of OnePlan	Fall 2003	Winter2004
4.1.3	Prepare Oneplan to be uploaded on to the web as a beta site with an integrated on-line evaluation process for receiving feedback for future modifications.	Winter 2003	Spring 2004
4.2	Develop outreach program to create a OnePlan guidance group made up of landowners, Yolo RCD, USDA-ARS, USDA-NRCS, and UCD representatives.	Summer 2001	Fall 2001
4.3	Populate OnePlan with local resource and remedial practice and information data,	Summer 2001	Winter 2003

	watershed concerns, maps, regulations and permitting requirements, economics, and case studies		
4.4	Survey existing farm practices and analyze the impact of these existing and alternative conservation systems in Union School Slough watershed using CREEDA and SWAT. *Appendix I: ARS Farmland Workplan*	Spring 2001	Winter 2004
4.5	Validate model results for farm and watershed level interpretations using field research data.	Spring 2002	Winter 2004
4.6	Modify plan as needed	Winter 2004	Spring 2004
4.7	Assist 3-6 landowners with using OnePlan to produce plans, assist with installation of 1- practice under each plan.	Fall 2003	Spring 2004
4.8	Load OnePlan onto RCD website	Spring 2004	Spring 2004

Task 5: Watershed and Farm-scale Conservation Education

Dedicated communication program, working in conjunction with the USSWIP project's education program, to disseminate project activities and results and the OnePlan concept within Yolo County and throughout the Bay-Delta plan area Strong emphasis is on showing how farming and the environmental can work together, within and beyond the riparian corridor, to support Bay-Delta species of concern. Goal is to increase land stewards (current and future generations) within and outside the watershed and the region who will carry information and implement practices to meet Bay-Delta goals and answer uncertainties.

Deliverables: Field Meetings & Workshops; Publication in Journals, Press and Internet; Grade school participation; attendance at farm and environmental conferenres and events. Staff invited as conference speakers for the project; increase in land stewardship projects.

5.1	Develop and refine existing materials regarding the costs and benefits of the practices listed in Task 2, using specific economic and ecological measures.	Winter 2002	Spring 2004
5.2	Coordinate with Audubon to incorporate project information into RCD's web site and wildlife-friendly fanning handbook, *Bring Farm Edges Back to Life!*	Summer 2001	Spring 2004
5.3	Create web page on RCD site featuring the project. Update as new information becomes available.	Summer 2001	Spring 2004
5.4.1	Take the project "on-the-road" to conferences as invited exhibitors or speakers, Colusa Farm Show, Duck Days, County Fair, and grower meetings, Board of Supervisors, Farm Bureau, Farm-City Banquet.	Fall 2001	Winter 2003
5.4.2	RCD will solicit local and farm press coverage for all events and the general project as it progresses.	Fall 2001	Winter 2003
5.4.3	Project news will appear regularly in USDA/RCD Yolo Service Center newsletter		
5.4.4	Project displays will be regularly updated to reflect project status through photos and literature. Project will develop at least 3 brochures on practices.	Summer 2001	Winter 2003
5.4.5	Establish and maintain regular communication of on-going project activities and results with other CALFED-funded programs and projects via web site.	Spring 2001	Spring 2004
5.5	Conduct three topical field meeting for growers and agencies per year with Auduhon CA and other partners	Winter 2001	Spring 2004
5.6	Write Project Development and Permitting case-studies for inclusion in web site, "Farm Edges" handbook, and Yolo OnePlan	Winter 2002	Spring 2004
5.7	Publish final project results in peer-reviewed journals and other media.	Spring 2002	Spring 2004
5.8	Conduct outreach via in-class presentations and/or hands-on field experience for local schools in cooperation with Audubon CA	Fall 2001	Spring 2004
5.9	Evaluate and refine education efforts with targeted surveys of field day workshop participants, staff, and cooperating growers, pre and post project implementation.	Fall 2001	Spring 2004

Task *6:* Project Management and Administration, Reporting

The Yolo County RCD will be responsible for project administration, management, subcontracting, engaging and hiring appropriate staff for the project, and ensuring that contract requirements are met through completion of quarterly and annual reports. RCD and Audubon CA project staff will meet at least monthly to assure coordination of project activities. The RCD Board of Directors will serve as the Guidance Committee for the

project. Their leadership will be supplemented with technical input from our large contact base of UC, USDA, SWRCB, DF&G, USF&WS scientists, and private conservation groups. We will also participate with the existing USSWIP Landowner Stewardship group for bi-annual meetings to provide regular project input, collect landowner feedback, and discuss adaptive management strategies with cooperators.

Deliverables: Project Administration, Quarterly & Annual Reports, Invoicing, Project Feedback Meetings & Responses

6.1	Hire additional project staff	Spring 2001	Spring 2001
6.2	Project oversight	Spring2001	Spring2004
6.3	Monthly coordination and information dissemination meetings between RCD and Audubon staff. Meet with Principal Investigators (P.I.s) as needed. Periodic site visits to cross-review project progress by RCD & Audubon staff and P.I.s.	Spring 2001	Spring 2004
6.4	At minimum, annual meetings with existing USS Landowner Stewardship Group.	Summer 2001	Spring 2004
6.5	Reporting	Summer 2001	Spring2004

Monitoring and evaluation of the efficacy of conservation practices, OnePlan development, educational programs, and general project progress are built in to the Scope of Work above. Monitoring and analysis techniques employed in Task 3 are summarized in *Table* 2 below and described in detail with appropriate references in *Appendices 1 & 3: USDA:ARS Farmland Workplan and RCD Monitoring Protocols.*

Table 2 ***Summary of Monitoring Techniaues***

Water quality sampling and evaluation:	
1. Winter storm flow stations in Union School Slough, off cover crop/fallow comparison fields. conservation tillage field, and two ARS-evaluated tailwater ponds	Collected by Isco 6700 and 3700 samplers paired with water level sensors. Samples will be sent to the USDA:ARS lab in Corvallis for analysis.
2. Sediment traps and three RCD-evaluated tailwater ponds	I-liter grab samples will be taken during 3 irrigation events at the inlets and outlets of the ponds at early mid and late periods of the irrigation events and analyzed at the RCD with Cardy meters, filter paper and scales.
3. All ponds and sediment traps	Contours will be surveyed before and after irrigation seasons to determine volume of sediment captured.
Slough & Canal Bank Stability (paired vegetated and control sites):	bank slips will be measured and ranked using a Weighted Category evaluation system
Vegetation monitoring (at all vegetated sites):	Random 1 sq. ft. quadrats, plant survival counts, and visual assessment.
Wildlife & wildlife habitat (at all vegetated sites):	USFWS, CDFG, and/or US EPA habitat evaluation criteria for special status species
	Spring bird nesting surveys; point counts; baited mammal track stations; seasonal, systematic surveys using sightings, tracks, fur, scat, nest, mound, exit holes, and other signs); sweep-nets (insects)
Additional **soil** and water quality assessments by **ARS** at conservation tillage and cover crop sites:	
1. Shallow ground water at ARS-evaluated cover crop and conservation tillage sites	Sampled from TIEMCO PVC high flow piezometers and suction cup lysimeters placed along two transects in the field
2. Nitrate-N and ammonium-N leached from the major root zone (0-30 cm)	Captured using suction cup lysimeters installed at approximately 60 cm below the soil surface.
3. Changes in N and C mineralization processes	Determined using an in ***situ*** buried bag method
4. mineralized N available to the grass sward	Above- and below-ground plant material will be sampled from randomly selected quadrants and total N determined. These data will be compared with temporal soil N and mineralization process data
5. Soil water retention and soil bulk density	Multiple soil cores will be sampled along transects

d. Data Handling and Storage: All personnel engaged by this project will keep updated and accurate records in the form of notebooks. All non-automated data will be logged on standardized data sheets. **All** automated data collected will be printed or, if possible, immediately transferred into a computer spreadsheet (EXCEL 5.0, Microsoft Corp.). All data logged onto data sheets or printed out onto hard copy, will be

immediately photocopied and entered into a computer spreadsheet. Eventually all data will be entered in EXCEL 5.0 spreadsheet where it can be managed and statistically analyzed. All data entered into the computer will be backed up on hard disk memory and on floppy disks, zip disks and/or CDs, which will be produced in duplicate and one copy stored at a separate location.

All personnel will be required to report on their progress on a monthly basis. Principal investigators will be responsible for synthesizing interpretive summaries of their data and providing these summaries to project manager. The principal investigators, according to the guidelines established by CALFED, will file reports with the Project Manager. The Project Manager will then be responsible for synthesizing all information into one integrated report for submission to CALFED.

e. Expected Products and Outcome: The products of this proposal are: 1) a working assessment of the Union School Slough Watershed, 2) a corresponding plan directing future work in the watershed, 3) establishment of two cover crop sites, one conservation tillage site, five tailwater ponds, five farm-drain sediment traps, and five hedgerow buffer comdors; 4) Quantification and published results of the water quality and wildlife habitat benefits of those practices along with canal and stream bank revegetation; 5) a beta-stage conservation decision-assistance tool (OnePlan) for Yolo County and 3-6 landowner plans generated by the growers; and 6) a coordinated watershed outreach program producing numerous articles, field meetings, presentations, and augmented RCD publications ("Farm Edges" Conservation Handbook and website) regarding project activities and results. The individual deliverables are noted within the Scope of Work in association with the specific tasks in section C.2.b. All these products are expected to lead to more resource and habitat conservation activities both in the watershed, but throughout the county and region.

f. **Work Schedule:** Project task and timelines are provided in the Scope of Work in section C.2.b. Many of the tasks, such as implementation and monitoring, are dependent upon each other for proper completion of the project. However, there remains some degree of independence between certain tasks which could be partially completed without others. A *summary* of these relationships between the major project tasks is outlined in the table below:

Task	Dependent Upon:	Partially Independent **From:**
1: Watershed Assessment	Tasks 3 & 6	Tasks **2, 4** & 5
2: Implementation	Tasks 1, 3 & *6*	Tasks 4 & 5
3: Monitoring	Tasks 1,2 & *6*	Tasks 4 & 5
4: OnePlan	Tasks 1, 2, 3 & *6*	Task5
5: Outreach	Tasks 1, 2, 3, 4, & ***6***	
6: Administration	Necessary for all tasks	

g. Feasibility: Over a decade of experience working with landowners, agencies, and scientists have proven to us that we are now at the right place at the right time. Practice and landowner relationships are well established with the "early adopters," even if most of their operational decisions continue business as usual. Funding for data and implementation incentives is critical to moving ahead. All the pieces we propose here have the backing of major agency scientists or programs.

Feasibility that the tasks described can be completed on time and without technical or weather related factors is demonstrated by the RCD's and sub-contractors' track records of activities and accomplishments and by the partner investigators' (ARS) published research from completed related projects. *(Section E. Qualifications and Appendices 1 & 3 ARS Farmland Workplan and Monitoring Protocols).*

D. Applicability to CALFED ERP Goals and Implementation Plan and CVPIA Priorities

1) Applicability to CALFED ERP Goals and Implementation Plan: As part of the Willow Slough Ecological Management Unit, the work plan for this proposal supports the EWP vision by "integrating agriculture and natural habitats to support ecological health." (EWP Vol. 2, p.343) All tasks seek to change agricultural management practices through proven remedial practices on-farm. This will provide habitat for CALFED "species of concern" and improve water quality, while maintaining agriculture's economic viability– stated interests in the ERPP (Vol. 1, pp. 169 and Vol. 2, p.342). The proposal also supports the major focus of the Yolo Basin Ecological Management Zone in EWP (Vol. 2, pp. 341-353) by increasing the health of its important ecological processes, habitats, wildlife species and plant populations and making substantial contributions to the health of the Delta. Proposal tasks will scientifically validate watershed conditions and conservation practices, provide a strong education and outreach program, and a landowner-generated planning tool, further supporting CALFED' s vision that the health of the Ecological Management Units of the Yolo Basin Ecological Management Zone "...can be maintained and restored only with the active participation of local watershed groups, which include local landowners and concerned individuals" (Vol. 2, p.345.) Specifically, proposal tasks have a direct bearing of the following CALFED ERP goals and uncertainties are:. Goals 1 and 3: At-Risk Species and Harvestable Species; Goal 4: Habitats; Goal 5: Non-native Invasive Species; Goal 6: Sediment and Water Quality; Uncertainty #12 Beyond the Riparian Corridor. *(see Conservation Practices and CALFED ERPP Objectives)*

2) Relationship to Other Ecosystem Restoration Projects: This project is the "next phase," along with the proposed "Willow Sough Rangeland Stewardship Program," of the currently-funded Union School Slough Watershed Improvement Program (CALFED grant number 98-E13). This proposal builds on the lessons learned through the USSWIP and directly related experience gained through RCD activities, past and present, leveraging well over $ 2,050,000 in local, state, and federal funds.

RCD leadership role in developing conservation techniques focuses on the use of native vegetation, water quality improvement, and habitat restoration. Multiple project sites have contributed increased soil stabilization, species diversity, and aesthetics, all without compromising farm viability. Our independent work and the Willow Slough Plan led to the Union School Slough Watershed Improvement Program. One of the strengths of this proposal is the amount of work that is directly related to CALFED goals and funding which precedes it. A synopsis of these RCD and our partner projects follows:

a. US Bureau of Reclamation: funded Total Resource Management Program (TRM), has implemented and monitored on-farm conservation practices throughout Yolo County over the past five years: $850,000

b. Bureau-funded collaborative project between the RCD and Reclamation District 108 to stabilize bank levees using native grasses. Also produced an analysis of native plant water use to determine how much water might be lost to the system from the stabilization project: $175,000

c. Department of Pesticide Regulation: study of native plant hedgerows as insectaries showed beneficial insect use and migration into surrounding crops with no increased populations of pest species. Total direct and in-kind costs: $180,000

d. State Water Resources Control Board: installation of pilot water quality and wildlife remediation practices – native grass roadside restoration, stream and irrigation canal bank revegetation, tailwater recovery ponds vegetated to wildlife habitat. Project provided basic design, installation, and maintenance methodology: $350,000

e. USEPA: Regional workshop series, "Farming for Wildlife" covered Colusa and Yolo counties, Grasslands, the Delta, and Merced: $52,000

f. USDA: Priority areas – Willow Slough Watershed, Cache Creek, and Colusa Basin Drain -funding of various sorts (Environmental Quality Incentives Program –EQIP- and the EQIP Education Program) has led to quick expansion of the RCD-recommended conservation practices addressed in this proposal. Funds are

granted to landowners based on the recommended list of practices developed by a local "Working Group" of farmers, ranchers, the RCD, and NRCS: $405,000 (last 4 years-exclusive of NRCS and RCD stafftime)

g. Growing rangeland management research effort in Willow Slough Watershed: a. Participating in the initial rangeland restoration and monitoring activities under the USSWIP with Audubon-CA. b. participation in Willow Slough Rangeland Stewardship Program (if funded by CALFED) c. two year Yolo RCD, Dow AgriSciences, and UC Davis – Weed Science Department (Joe DiTomaso) starthistle control trials in Willow Slough Watershed rangeland. *(Attachment **5:** Clopyralid Demonstraton Trial.* The Yolo RCD also carried out a pilot forage study on rangeland native grasses. *(Attachment 6: Native Grass Forage Study). $8,000*

2) Research led by UC Cooperative Extension and the RCD has documented the dramatic reductions in winter runoff using winter cover crops (and conservation tillage) as opposed to fallow ground. $29,500

3) USDA:ARS is collaborating with the RCD and Audubon-CA to test a set of farming system/conservation practices on one set of integrated fields and with two rangeland ranchers. Cropland studies include: evaluation of a new design for tailwater ponds, cropping rotations designed to benefit soil and crop health, canal revegetation for wildlife and erosion control, adding native grass production into the standard cropping system to test marketability and to add biomass to the soil, thus improving soil structure. In general, this project will monitor potassium and nitrates in the soil and nutrients in runoff *(Appendix I: ARS Farmland Workplan)*

4) UC Davis, I.C.E. project is developing a ranch management planning tool, which, when complete, will become a planning module within the Yolo OnePlan. (comm. with Mel George, UCCE and Mike McCoy, I.C.E.). An RCD survey of county landowner concerns and needs revealed farmers are interested in an on-line decision support tool addressing their concern about growing hindrances (compounding regulations and permits) to their private conservation/stewardship efforts *(Attachment 7: Landowner Web Survey)*.

5) The USSWIP's "landowner service" has successfully implemented project planning and permitting while increasing agency coordination and speed in project approval and funding. $230,000.

3) Requests for Next-Phase Funding

The partnership of the Yolo RCD and Audubon-CA on the USSWIP has allowed us to work together under the guidance of the Willow Slough Plan. The RCD proposal and Audubon-CA's, "Willow Slough Rangeland Stewardship Program" *(Appendix 6 WSRSP Executive Summary)* provide a holistic approach to the Union School Slough Watershed while dividing tasks between the RCD and Audubon along lines of experience and interest. Because of the size of the projects, it is fiscally prudent for us to submit separate proposals. We are co-housed, have regular meetings and site visits to discuss our projects, work with many of the same cooperators, and are collaborating on supplemental funding sources. Ours is an extremely strong relationship, which has exponentially increased the numbers of landowner participants, agency and academic partners, scientific data and tools for bringing habitat and water quality solutions into the watershed.

4) Previous Recipients of CALFED or CVPIA funding

As previously mentioned, "Sustaining Agriculture and Wildlife Beyond the Riparian Corridor" is the *next* phase of the Union School Slough Watershed Improvement Program (CALFED Grant # 98-E18) and coordinates with that continuing project and with Audubon-California's "Willow Slough Watershed Rangeland Stewardship Program," currently being proposed to CALFED.

5) System-Wide Ecosystem Benefits

The Willow Slough Plan recognizes upper and lower watershed resource problems are intimately tied to one another, so that only an integrated approach to managing watershed resources can improve overall watershed health. The USSWIP, Yolo RCD and Audubon proposals for next-phase funding of the Union school Slough Watershed Improvement Program provide a synergistic, and integrated approach to implementing the Willow Slough Plan and bringing those solutions to others throughout the Bay-Delta region.

Conservation Practices and CALFED ERPP Objectives
(Reviewed and confirmed by National Audubon Society biologists)

NHANCEMENT – (through removal of Son-Native Invasive Species (in establishing Hedgerow Buffer Corridor Demonstration sites)

ative spp.	3) Harvestable Species	4) Habitats	5) non-native spp.	6) water & sediment quality
Group II) (V1.p288); g raptors including Swainsons Group II) (V1.p252); nia tiger salamander (Group 111) 24); n spadefoot toad (Group III) 27); California red-legged frog 111) (V1.p330);. n pond turtle (Group III) 36); garter snake (Group III) 21); Neotropical bird guild IV) (V1.p364); ory waterfowl (Group IV) 60);	• Central Valley upland game (Group IV) (V1.p367); • Migratory waterfowl (Group IV) (V1.p360);	• Increase area and protect and improve quality of riparian and riverine aquatic (V1.p143)) (V2. 344), seasonal wetland (V1.p138), and perennial grassland habitats (V1.p164); • Design slope protection measures that allow shoreline riparian vegetation to be established within levees (V1.p149); • Improve associated wildlife habitat values on agricultural lands to support special-status and other wildlife (VI.p169); • Improve riparian corridors along basin creeks and sloughs as habitat areas and migration corridors for wildlife and waterfowl (V2.p335).	• Reduce adverse effects of invasive riparian and marsh plant species on native spp. and ecological processes, water quality and water conveyance systems (V1.p476, V2.p335); • Establishing weed control programs to suppress the expansion on tamarisk (V1.p474), giant reed (V1.p473), Himalayan blackberry; • Control invasive plants to allow native riparian plant species to naturally propagate (V2.344).	• Ensure that all waters of mainstem tributaries entering the Bay-Delta a concentrations of toxic substances. restoring habitat, managing watersh supporting existing programs for co agricultural point and non-point sou (V1.p504)..

F BUFFER CORRIDORS

native spp.	3) Harvestable Species	4) Habitats	5) non-native spp.	6) Sediment and Water Quality
(Group II) (V1.p288); ng raptors including Swainsons (Group II) (V1.p252) (depending species used); rn spadefoot toad (Group III) 327); California red-legged frog p III) (V1.p330);. m pond turtle (Group III) 336); garter snake (Group III)	• Central Valley upland game (Group IV) (VI.p367); • Migratory waterfowl (Group IV) (V1.p360);	▪ Increase area and protect and improve quality of riparian (V1.p143)) (V2. 344), and perennial grassland habitats (V1.p164); • Improve associated wildlife habitat values on agricultural lands to support special-status and other wildlife (VI.p169);	• Reduce adverse effects of invasive riparian plant species on native spp. and ecological processes, water quality and water conveyance systems (V1.p476, V2.p335); • Establishing weed control programs to suppress the expansion on tamarisk (VI.p474), giant reed (V1.p473), Himalayan	• Ensure that all waters of mainstem rivers entering the Bay-Delta are free of high c toxic substances.. including restoring ha watershed, and supporting existing progr controlling agricultural point and non-pc (V1.p504)..

21); Neotropical bird guild IV) (V1.p364); ory waterfowl (Group IV) 60);		• Improve riparian corridors along sloughs as habitat areas and migration corridors for wildlife and waterfowl (V2.p335).	blackberry;); • Control invasive plants to allow native riparian plant species to naturally propagate (V2.344).	

ER **PONDS**

native **spp.**	**3)** commercial & recreational **spp.**	*4)* functional habitat types **for public** values	5) non-native **spp.**	*6)* water & sediment quality
(Group II) (V1p288); sons Hawk (Group II) (V 1.p252) on tree species used); rnia tiger salamander (Group III) 4); m spadefoot toad (Group III) 7); rnia red-legged frog (Group III) 0); ern pond turtle (Group III) 6); atory waterfowl (Group IV) 0); opical bird guild (Group IV) 54)	• Central Valley upland game (Group IV) (V 1.p367); • Migratory waterfowl (Group IV) (V1.p360);	• Increase area and protect and improve quality of riparian and riverine aquatic (V1.p143) (V2. 344), seasonal wetland (V1.p138), and perennial grassland habitats (V1.p164); • **Improve** associated wildlife habitat values to support special-status and other wildlife (VI.p169).		• Ensure that all waters of mainstem rivers and tr entering the Bay-Delta are free of high concent substances...including restoring habitat, manag and supporting existing programs for controllir point and non-point sources (V1.p504);); • Improve irrigation techniques (V1.p509); • Reduce poor quality agricultural tailwater ente Bypass canals and sloughs.(V2.p335).

ON CANAL VEGETATION (evaluating **species use** of existing native **species** revegetation **sites** compared **to** bare banks)

native spp.	**3)** Harvestable **Species**	**4)** Habitats	**5) non-native spp.**	*6)* **Sediment** and Water **Quality**
garter snake (Group III) p321); ornia tiger salamander {GroupIII) p324); ern spadefoot toad (Group III) p327); tern pond turtle (Group III) p336); atory waterfowl (Group IV) p360);	• Central Valley upland game (GroupIV) (V1.p367); • Migratory waterfowl (Group IV) (V1.p360);	• Improve associated wildlife habitat values of agricultural land to support special-status and other wildlife (VI.p169)		

ION TILLAGE AND COVER CROPS (as forage)

native spp.	**3) Harvestable Species**	**4) Habitats**	**5) non-native spp.**	**6) water & sediment quality**
ory waterfowl (Group IV) 60);	• Central Valley upland game (Group IV) (V1.p367); • Migratory waterfowl (Group IV) (V1.p360);	• Improve associated wildlife habitat values of agricultural land to support special-status and other wildlife (VI.p169)		• Ensure that all waters ofmainstem rivers and trib entering the Bay-Delta are free of high concentrat substances.. .including restoring habitat, managin and supporting existing programs for controlling point and non-point sources (V1.p504); • Improve irrigation and tillage techniques (V1.p5(

FRIENDLY CROPS (as a result of the interface between tailwater ponds and Hedgerow Buffer Corridors and adjacent cropping systems; inciuded in Education tasks to add **s Back to Life!" manual and RCD website)**

native spp.	**3) Harvestable Species**	**4) Habitats**	**5) non-native spp.**	***6)* Sediment and Water Qu:**
tory waterfowl (Group IV) 360);	Central Valley upland game (Group IV) (V1.p367); Migratory waterfowl (Group IV) (V1.p360);	Improve associated wildlife habitat values of agricultural land to support special-status and other wildlife (VI.p169)		

tional outcome of Hedgerow Buffer Corridors along **crop/riparian interface, as beneficial insects are attracted to plant species used in the corridors)**

native spp.	**3) Harvestable Species**	**4) Habitats**	**5) non-native spp.**	**6) water & sediment quality**
3 (Group II) (V1.p288); ging raptors including Swainsons : (Group II) (V1.p252) (depending ie species used); em spadefoot toad (Group III) ,327); California red-legged frog ap III) (V1.p330);. em pond turtle (Group 111) 336); t garter snake (Group III) 321); Neotropical bird guild up IV) (V1.p364); atory waterfowl (Group IV) p360);	• Central Valley upland game (Group IV) (V1.p367); • Migratory waterfowl (Group IV) (V1.p360);	• Improve associated wildlife habitat values of agricultural land to support special-status and other wildlife (VI.p169) • Increase area and protect and improve quality of riparian (V1.p143)) (V2. 344), and perennial grassland habitats (V1.p164); • Improve associated wildlife habitat values on agricultural lands to support special-status and other wildlife (VI.p169); • Improve riparian corridors along sloughs as habitat areas and migration	• Reduce adverse effects of invasive riparian plant species on native spp. and ecological processes, water quality and water conveyance systems (V1.p476, V2.p335); • Establishing weed control programs to suppress the expansion on tamarisk (V1.p474), giant reed (V1.p473), Himalayan blackberry;); • Control invasive plants to allow native riparian	• Ensure that all waters of main stem rivers and tri entering the Bay-Delta are free of high concentra substances.. .including restoring habitat, managi and supporting existing programs for controlling point and non-point sources (V1.p504); • Place aerial restrictions on pesticide spay and us pest management *to* reduce pesticide use and co discharge to waterways during rainstorms (V1.p

		corridors for wildlife and waterfowl (V2.p335).	plant species to naturally propagate (V2. 344).	

y # 12 Beyond the Riparian Corridor: The above conservation practices are used in farming operations "beyond the riparian corridor" support the species listed in thi

E. Qualifications – Project responsibility per task will be as follows:

Table 4

Task	**Yolo** County RCD	**ARS**	**Audubon**	**UC Davis**	UCCE-Rachael Long	**UCCE-David Kelly**
1: Watershed reconnaisance	Evaluation Specialist & Vegetation Mgmt. Specialist		Existing data from **USSWIP**	CFWSM peer review of protocol		Support for sediment delivery assessment
2: Practice Implementation	Vegetation Mgmt Specialist		**Tailwater ponds under** USSWIP	**CFWSM peer review of HBC** protocol & results		
3: Monitoring	Evaluation Specialist	Steve Griffith (subtasks 3.1-3.3)			Over-wintering pest monitoring in hedgerows (subtask **3.8)** ***Attachment 9***	
4: OnePlan	Vegetation Mgmt Specialist oversight of RCD One Plan (tasks	Jeff Steiner Toshimi Minoura (OSU) plan develop-ment	Rangeland and other data for cons. effects	McCoy: I.C.E CFWSM peer review		
5: Outreach	Watershed Education Coordinator					
6: Administration	Vegetation Mgmt Specialist & Evaluation Specialist					

The RCD's primary partners in this proposal are Audubon-CA through the USSWIP and staff from the USDA-ARS Forage Seed Research Lab, who are contributing their time to the project. RCD Board will serve as the Project Guidance Committee.

Researchers (In-kind): ARS Farmland Research Project and Yolo OnePlan

Stephen M. Griffith: (P.I) USD-ARS Corvalis, Or. Research Plant Physiologist with USDA-ARS since 1986. Currently, he serves as a team member and leader of groups of scientists addressing sustainable grass seed cropping systems with emphasis on small farm sustainability. His research looks to optimize economic and environmental factors associated with nutrient use, reduced tillage, and post-harvest residue management. Specific research involves the soil biogeochemistry of agricultural and unmanaged lands as it relates to N and C cycling, especially under hydric conditions, riparian zone function in improving water quality, N management of grass seed crops, and applying site specific process and biogeochemical information in a landscape context. Recent accomplishments include: the development of optimal fertilizer N timing, rate, and N-source practices for grass seed crops in western Oregon; improved understanding the physiology of N use by grasses grown for seed; better understanding the temporal and spatial components of N and C cycling in grass seed production systems and adjacent riparian zones and their relationship to crop fertility and water quality.

Jeffrey J. Steiner: USD-ARS Corvalis, Or. Joined the USDA-ARS in 1988. He has conducted research that determines the impact of environmental and agronomic factors on the developmental biology and productivity of forage and turf seed cropping systems. He has also developed approaches to more efficiently utilize diverse genetic resources held in **ex** *situ* forage legume germplasm collections using biochemical markers and GIS databases. In addition to developing a complete package of production components for red clover seed production systems, he has investigated ways to produce perennial grass seed crops with maximal amounts of post-harvest residues and using no-till establishment in the absence of open-field burning. His most recent

research involves designing a computer decision aid that assesses the economic viability and environmental impact of alternative cropping systems.

Development **of Yolo** OnePlan **(In-kind)**

Gerald Whittaker: (P.I.) USD-ARS Corvalis, Or. J.D. joined USDA-ARS in 1999. Dr. Whittaker graduated from Northwestern School of Law, Lewis and Clark College in 1971, received his M.S. in Resource Economics at Oregon State University in 1981 and a B.S. in Chemistry at Oregon State University in 1971. Further graduate study was in economics (University of Minnesota) and statistics (USDA Graduate School). Published reports concern farm finance, incentive policies for environmental remediation, agricultural policy, spatial statistics and geographic information systems. Contributed to USDA staff analysis and reports on economic and environmental issues, publications in Applied Economics, Journal of Agricultural Economics, Sankhya, and others. Dr. Whittaker's role (0.2 FTE, USDA-ARS cost-share) on this project will be to analyze data associated with Hypothesis 2 using spatial statistics, nonparametric economic models of production, and hydrologic models.

Mike McCoy: Co-Director of the Information Center for the Environment (I.C.E) at UC Davis. Mr. McCoy has 23 years of experience in information management and education. He has developed over 400 short courses and conferences on contemporary issues in environmental assessment and management including programs on watershed assessment, water quality control, land use planning, endangered species policy, fire ecology and environmental economics. For the past 5 years he has served as Principal Investigator, Co-Principal Investigator or Academic Administrator for $7 million in contracts and grants awarded to projects involving the collection, aggregation, and dissemination of environmental information via the internet. His current projects include multiple studies of watershed health, and the development of solutions to data aggregation and distribution problems for the California Biodiversity Council, the National Park Service, the United Nations Man and the Biosphere program (MAB), the Biological Resources Division of the U.S. Geological Survey (BRD) and many other State and Federal agencies. *(Attachment 8: Publications)*

Sub-contractor to ARS for Yolo OnePlan Conservation Planning **Tool** Development

Toshimi Minoura: Oregon State **University** -Education: B.S. Electrical Engineering, University of Tokyo, Tokyo, 1968. M.S. Electrical Engineering, University of Tokyo, Tokyo, 1970. Ph.D. Electrical Engineering, Stanford University, Palo Alto, CA, 1980. Associate Professor in the Department of Computer Science at Oregon State University, Corvallis, OR (Assistant Professor, Oregon State University, Corvallis, and 9182--9/88; Associate Associate Professor, Oregon State University, 9/88—current). Dr. Minoura was Principal Investigator of the USDA Forest Service grant PNW 87-417 "Design of a Virtual Database Management System for the Synthesis and Integration Project of the Forest Response Program," 1987-90. In this project, they designed and implemented an information resource management system for the Synthesis and Integration (SI) Project of the Forest Response Program administered by U.S. Environmental Protection Agency. The system was used to manage the data collected by the SI project. Our major contribution was to have demonstrated that a relational database could be used for the intended application. When this project was started, a relational database system was not being used within Forest Service or EPA. Dr. Minoura's primary responsibility on this grant will be computer programming and associated duties related to the Yolo OnePlan development and CREEDA assessment tool as described in Approach and Methodology for Hypothesis 7 USDA-ARS Farmland Work Plan and Task 4 Scope of Work. *(Attachment 8: Publications)*

Researchers **(In-kind):** Union School Slough Assessment

Vern Finnev: **(P.I)** USDA: NRCS California State Office. Verne holds a Bachelor and Masters of Science degrees in Geology from Florida State University plus 30 additional semester hours of post-graduate studies. Over 30 years, he has developed sediment and nutrient budgets on watersheds and river basins. In 1982, he chaired the Great III Erosion and Sediment Inventory for the St. Louis Corp of Engineers culminating in the

Great III Erosion and Sediment Inventory Report. In California he has prepared sediment budgets for the Calleguas Creek and Malibu Creek Watersheds, and a nutrient budget for the Malibu Creek Watershed.

In 1976 he assisted the Kansas Fish and Game in sampling fish tissue (bio-assays), statewide, for pesticides. In Missouri, he applied the model CREAMS to assess the potential for transport of pesticides in surface runoff and infiltrating waters. He has used the model NPURG to assess soilipesticide leaching potential and soilipesticide surface loss potential. As a developer of ARS water quality models at Morris, MN (3 years), he assisted in the inclusion of sub-routines on hydrology, engineering practices, soils, management, tillage practices, etc. Into the non-point source models AGNPS and WEPP. He has used models to apply the principles of soil science, engineering, agronomy, limnology, and geology. He has provided modeling assistance to the states of California, Missouri, Minnesota, Utah, Michigan, Wisconsin, Indiana, New Mexico, Alabama, Delaware, and Georgia. Mr. Finney's strengths are in applying basic physical and chemical principles in the environment. Mr. Finney is a beta tester for the continuous storm event model AnnAGNPS and is currently determining the application of the NLEAP and REMM models in California. *(Attachment 8: Publications).*

Overall RCD project staff coordinators (existing). Additional staff to be hired for field work, OnePlan, and education and outreach program:

Paul Robins: Manager of RCD Model Farms Program since 1995, Robins and his colleague, Jeanette Wrysinski, work closely with local farmers to conduct trials and evaluate and communicate the results of on-farm conservation practices. These include tailwater return ponds, insectary hedgerows, irrigation water management, cover crops, riparian enhancement, noxious weed management (Yellow starthistle & *Arundo donax*), and canal bank and roadside native grass establishment. As manager he has also been responsible for the project's $120,000 annual budget and has produced all of the appropriate documentation and reporting for the project funder, the US Bureau of Reclamation. He hold an M.S. in Community Development and B.S. degrees in International Agricultural Development and Landscape Architecture from UC Davis. His Master's thesis focused on landowner interest in, and acceptance of, wildlife conservation activities along Willow Slough.

Jeanette Wrysinski: As Evaluation Specialist for the Yolo County RCD since 1995 for the Model Farms Program (MFP), she has designed and coordinated the monitoring program to determine the conservation effects on plant and wildlife species. Jeanette has a degree in Plant Science with Specialization in Plant Pathology from the University of California at Davis, 1979. Prior work has included managing field research trials on Integrated Disease Management in the Dept. of Plant Pathology, UC Davis, Manager of the Weed Control Research Program at the California Rice Experiment Station at Biggs, and Grower Liaison for the Private Lands Program (Valley C.A.R.E.) for Ducks Unlimited's Western Regional Office.

Tom Muller. Bruce Rominger, Scott Stone. Jennifer House. and Heidi Aoki: Yolo RCD Board of Directors and Project Guidance Committee. All are farmers or agricultural consultants, most with lifetime experience in the farming industry. Their operations range from conventional to organic, row-crops to orchards to rangeland. All five directors have a minimum of 3 and up to 15 years experience, both through formal programs and informal experimentation, in using the wildlife and conservation practices prescribed in this proposal.
All directors assisted in developing the focus of the proposal from the perspective of both agriculture's and wildlife needs. Monthly board meetings give us the opportunity to share ongoing results of our current projects and allow valuable input from the Board, which, because of their overall experience, adds an important balance in perspective to our work. They are our eyes for seeing the real world "beyond the riparian corridor."

F. cost

1) Budget: Total budget request: $1,464,167. **A** program budget is included in ***Table 4 (as a separate page following)***, which details costs for each year of the ***3*** year program broken down by tasks as identified in the Scope of Work (Section C.2.b.) as well as a 3-year total project costs. Below are general descriptions of the basic expense categories for the proposal.

Salaries and Benefits:

All RCD staff listed below receive additional 17% benefits		
Evaluation Specialist	1 F.T.E.	$23/hr.
Vegetation Management Specialist	1 F.T.E.	$23/hr.
Watershed Outreach Coordinator	***.75*** F.T.E.	$18/hr.
Monitoring Assistant	1 F.T.E.	$16/hr.
Monitoring interns	2 x 0.5 F.T.E	$10/hr.
Data Entry for OnePlan	1 F.T.E.	$14/hr.
Exec. Director (work on OnePlan)	0.35 F.T.E.	$33/hr.

Travel: Travel expenses include fuel and maintenance costs for RCD truck and $0.31/mi. reimbursement rate for personal vehicle use for project activities. Travel will be primarily for transit to and from field sites but will also include meetings and outreach activities.

Supplies: Supplies include all items under $1000 that are required for project tasks. They include plant materials, tools, monitoring supplies, office supplies, and outreach materials.

Service Contracts: The RCD will be the contracting party responsible for payments, reporting, and accounting for *the* program. The RCD will subcontract components of the monitoring program (Task 3) and OnePlan development (Task 4) to the USDA Agricultural Research Service as noted above in Section E. and detailed in the attached ARS work plan. Smaller subcontracts will also be made with University of California Cooperative Extension under Watershed Assessment (Task 1) and Monitoring (Task 3) for sediment delivery estimation and winter insect pest monitoring, respectively. Individual budgets for these service contracts are contained in the attached work plans.

Other subcontractors that we expect to perform portions of the work to implement conservation projects under Task 2 of the Scope of Work have not yet been identified. Cost estimates for these services are based on our experience with this work under previous projects.

Equipment: The primary equipment purchases required for this project are for water sampling and water level monitoring devices to be installed under Task 1 and Task ***3***. A total of 12 Isco 3700 Automated Water Samplers and water level sensors (with data loggers) will be purchased as part of the project. The combined units cost approximately $6,000 each. Additional equipment to be purchased include a desktop computer for the RCD OnePlan data entry personnel and two laptop computers, one for field data collection from automated sensors and one for project management. A compact used truck and shell $16,000.

Overhead: An overhead rate of 10% is included on the total program budget (excluding equipment). Overhead includes costs associated with general office requirements such as rent, phones, utilities, auditing, administrative support, furniture and equipment. Overhead costs are not different for state and federal funds.

2) Cost-Sharing: ***Minimum $4,343,280 (see Cover Sheet and Relationship to Other Ecosystem Restoration Projects for details)***

G) Local Involvement

Local involvement will primarily be through direct participation of landowners in providing sites for demonstration and research of the conservation practices. The USSWIP Landowner StewardshipGroup, the OnePlan guidance group, and RCD Board will provide feedback on the entire project over the grant term. Inquiries soliciting local landowner interest for participating in this proposed project have already yielded 10 positive responses. These landowners are ready to and have submitted support letters, which are attached.

Additional strong technical support will be provided through the Yolo County Service Center who will be assisting in recruiting landowners, developing plans, conducting site visits, and obtaining additional implementation funding, primarily through the USDA: EQIP program.

Our strong education and outreach program will further reach a variety of local audiences. With a dedicated education coordinator, we will have more opportunities to make presentations to local service groups, government councils, and schools. Students from Davis High School are already assisting with taking erosion measurements in the upper Union School Slough watershed. This project is intended to continue if funding can be secured from US Fish and Wildlife Foundation (request submitted). Additionally, Woodland High School has a strong Ag department and the are very interested in having their students participate in the project so they can add wildlife and biodiversity elements to their traditional education curriculum.

The Yolo County Flood Control and Water Conservation District and the County have supported watershed assessment and restoration activities since the development of the WSP. Their funding and construction work have added large matches to several of our previous and present projects. The County Planning and Public Works staff have assisted the RCD and Audubon with many issues surrounding permitting for the USSMP and have also provided a host of maps for the project and the WSP process.

The RCD has a strong network of local partners from the University through a number of agencies and organizations. The Yolo County Farm Bureau has lent its support to the project and a number of its members have been cooperators with us over the years. Bureau members working hard to understand and accept the role of habitat and wildlife in their operations and, like non-Bureau farmers, are working to change their operations as time and funding allow.

H) Compliance with Standard Terms and Conditions

The RCD will comply with state and federal Standard Terms and Conditions in Attachments D 7 E of the Proposal Solicitation Package.

There are no CALFED-funded construction activities in this project. Construction of sediment basins will be performed, in-kind, by the Yolo County Flood Control and Water Conservation District.

I) Literature Cited*: See Appendix* 4

J) Threshold Requirements (except for Cover Sheet)

The following completed forms are included:

Letter of Government Notification: Yolo County Board of Supervisors (also sent to Clerk of the Board) and Yolo County Planning and Public Works)
Non-discrimination Compliance (Yolo RCD and Subcontractor ARS)
Environmental Compliance Checklist
Land-Use Checklist
Contract Forms – Federal 424 A-C

APPENDICES

RESEARCH WORK PLAN FOR FIELD-BASED RESEARCH ON SUSTAINING AGRICULTURE AND WILDLIFE BEYOND THE RIPARIAN CORRIDOR

USDA-ARS, Corvallis, OR, Yolo RCD, Southern Oregon University, UC Davis I.C.E., UC Davis Center for Integrated Watershed Science and Management

Problem.
Since approximately 25% of pollutants in rivers and 15% in lakes are sediments from agricultural land, factors that improve infiltration or reduce soil erosion and runoff contribute to protecting surface water non-point pollution (Baker and Laflan, 1982; Carey, 1991).

The Willow Slough Plan (1996) identified five principal erosion problems commonly occurring in the Willow Slough watershed: sheet and rill, gully, streambank, and roadbank, and mass movement. The greatest source of sediment on the cropland (valley floor) was from sheet erosion on unvegetated cropland and streambank erosion. Aside from losing a valuable natural resource from fertile farmland, soil loss by erosion processes and the accompanying sedimentation creates costly field releveling and redredging of road and farm culverts. Estimated soil losses from irrigated fields in Yolo County can exceed 7,000 kg ha^{-1} or more (Rominger, personal communication). Farmers interviewed during the development of the Willow Slough Plan "were reluctant to substantially modify existing farming practices" (Willow Slough Plan, 1996). "Because the implementation of the plan was voluntary, alternative cultivation practices were sought that would provide flood control or other benefits without substantially disrupting existing farm activities" (Willow Slough Plan, 1996). Nowhere in the Willow Slough Plan was conservation tillage (no-till) practices recommended as an alternative conservation practice. It is well documented that implementation of conservation tillage practices can provide substantial economic savings to farmers and be major soil erosion deterrent. Unfortunately, farmers are more reluctant to adopt new practices unless "proven" locally. In combination with conservation tillage, sediment traps constructed down slope on irrigated cropland can significantly reduced sediment loads to canals and streams. Aside from reducing soil loss, conservation tillage also enhances soil health and reduces nutrient loss off site.

Continued monoculture production with conventional tillage and residue removal will negatively impact environmental quality, natural resource conservation, and farm sustainability (Papendick et al., 1986). Tillage and residue removal increases soil erosion, reduces soil sequestered organic and inorganic N and C, and reduces the activity and diversity of biotic components within the soil ecosystem (Kennedy and Smith, 1995; Wander et al., 1995; Zelles et al., 1995).

The proposed site-specific analysis decision aid will integrate both economic and environmental impact assessment tools to evaluate complete crop rotation systems. The approach is unique and will use complete crop rotation sequence as the time-frame basis for the analysis and actual empirical results from research results to develop economic budgets for typical production systems used by farmers. The concept of cost-benefit evaluation of for alternative production systems has been done using simulated data (e.g., Kelly et al., 1996), but site-specific analyses based on research results are rare. The tool will not utilize a mechanistic model to simulate plant growth (e.g., EPIC: Jones, et al., 1991) and will be more robust than traditional enterprise budgeting methods (e.g., Cost and Return Estimator, USDA-SCS, 1988; and MBMS Enterprise Budget Generator, McGrann et al., 1986). It will evaluate production costs and returns using the Profits and Costs (USDA-NRCS, 1999) budget generator, and simultaneously assess elements of the USDA-NRCS SWAPA+H (Soil, Water, Air, Plant, and Animal plus Human) effects categories using various existing environmental impacts tools (e.g., RUSLE, SCI, and WinPST) for complete multiple-year crop rotations. The use of a multi-

tier component object platform is an emerging technological approach that overcomes difficulties found with other programming platforms by allowing relatively easy program and database updating without interfering with access by the user interface (Sessions, 1998). Data produced from these analyses will be used with other decision aid software (e.g., Eco-Easy, 1995) to make cost-benefit analyses of non-dollar-valued investments (Orth et al., 1998). Estimated economic impacts for state-wide production practice changes are available for Washington (WSU, 1997). Enterprise budget information is available in Oregon, but no information is available regarding the profitability of alternative grass seed and livestock production systems (OSU, 1989). Quantitative approaches integrating economic and environmental impacts of production systems are needed to assist decision makers and to help the agricultural community deal with multiple resource conflicts (Abdall and Kelsey, 1996).

1 c. HYPOTHESES TO BE TESTED IN THIS USD.4-ARS WORK PLAN (NOTE: H 2 and 3 are part of Audubon-CA's Willow Slough Watershed Rangeland Stewardship Program proposal under the CALFED 2001 PSP – *see* ***Appendix*** *7 Willow Slough Rangeland Stewardship Plan - Executive Summary)*

The hypotheses numbering listed below are specific to this workplan

H 1a. Tailwater capture systems will reduce sediment and nutrient load of water moving into Delta waterways

H4. Upland fallow land management techniques such as conservation tillage and cover crops not only reduce winter runoff but also improve soil quality and decrease off-site nutrient loading to streams.

H6. Watershed-wide monitoring will reveal where conservation intervention is most needed.

H7. A private landowner Conservation Decision-Assistance Tool will assess the economic and environmental impact of agricultural and conservation practices and determine the relative economic and conservation values of different conventional and alternative conservation systems and evaluate their cost/benefit ratios.

2 h. Approach - Site and Treatment Descriptions: The effect of cover crop versus fallow (bare) furrows and conservation tilled ground versus conventionally tilled ground on the fate and transport of suspended sediment, nutrients, and volumetric measurements of winter storm runoff for 2-3 years (USDA-ARS Corvallis) will be conducted on a family farm located in Yolo County, CA. Fields of approximately 80 to 100 acres will be established, one using conventional and the other conservation methods of establishment and management. Conservation practices use no till crop establishment and cover crops, while conventional operations will use tillage and over winter fallow conditions. Both fields share the same soil series. Soil C and N transformation processes (e.g., mineralization and denitrification), soil erosion, and soil physical and chemical changes, will be studied to improve crop nutrient efficiency (e.g., optimal fertilizer inputs) and quantify off-site losses, and on-site N and C sequestration.

APPROACH AND METHODOLOGY FOR HYPOTHESIS 1A. Tailwater capture ponds will reduce sediment and nutrient loads in surface waters moving off-farm.

Soil erosion, suspended solids, and nutrients. Effects of field soil erosion and sediment (suspended solids) and water chemistry will be monitored using double-pond systems as specified by Robins (1999). Each field will have it's own trapping system. The first pond in series acts as a sediment trap that is designed for easy excavation of trapped sediment. Accumulated trap sediment will be quantified by subtracting the trap's final sediment volume from the initial trap volume without sediment. Sediment dry mass will be determined from sediment cores sampled from the trap. Sediment mass will be determined from oven dried samples. Total field soil erosion losses will be expressed as kg soil ha^{-1} yr^{-1}. Sediment core sub-samples will be analyzed for nitrate-N, ammonium-N, and total phosphorus as outlined by.

Horwath et al. (1995). Total suspended solid mass and bound P and N will be determined from filtered samples taken from pond surface water using both ISCO automated collectors and by grab sampling as outlined by Honvath et al. (1995). Sampling of surface and shallow ground waters will be storm and irrigation event based. Shallow ground water will be sampled from TIEMCO PVC high flow piezometers and suction cup lysimeters placed along two transects in the field. Furrow and canal discharge will be estimated with a rating curve based on flow stage and discharge values calculated with Manning's equation (Albertson and Simons, 1964). Rating curve validation will be performed with flow measurements made with a Swoffer flow meter at varying stage heights up to bank full flow. Use of pre-calibrated flumes or weirs are not practical for this study site. Deep pyrometers will be installed and equipped with vented, Geokon vibrating wire pressure transducers. Campbell CRlO data loggers will capture data collected from these sensors every 10 minutes.

APPROACH AND METHODOLOGY FOR HYPOTHESIS 4. Upland fallow land management techniques such as conservation tillage and cover crops not only reduce winter runoff but also improve soil quality and decrease off-site nutrient loading to streams.

Nitrogen (N) and Carbon (C) Cycling. Changes in N and C mineralization processes will be determined using an *in situ* buried bag method (Eno, 1960). Replicated incubations will be renewed every six weeks; nine per year. Briefly, an intact soil core will be removed, sealed within a zip-seal polyethylene bag, and replaced in its original position in the ground. **A** second core will be taken for determination for initial inorganic N (NO_3-N and NH_4-N) and C analyses. Sub-samples of soil will be taken for determination of soil moisture by gravimetric methods and soil microbial biomass. Soil biomass C will be determined using the chloroform fumigation extraction method described by Honvath et al. (1994). Total organic carbon will be quantified with high temperature catalytic combustion and infrared detection on a Rosemount/Dohrman DC-190. Soil pH will be measured using a glass electrode (1:2, soil: water ratio). Soil organic matter (total C) will be estimated using a loss on ignition method. Air and soil temperature and precipitation are factors that have been shown to affect N cycling and will be measured continuously using a Campbell Scientific data logger. Since nutrient cycling processes are governed to a large extent by soil oxidation and reduction characteristics, soil E_h will be measured with triplicate Pt electrodes installed at two depths (25 and 45 cm) along established. The electrodes will be read according to Austin (1993) on a high impedance voltmeter.

Soil Abiotic Properties. Within each of *the* three replicated quadrates in each restoration stage treatment, multiple soil cores will be sampled along transects and analyzed for water retention and soil bulk density. Soil water retention curves will be determined as described by Klute (1986) using a suction cell apparatus (Soil moisture Equipment Crop., Santa Barbara, CA). Water retention curves and bulk density will be performed in Year-I and Year-3. Soil bulk density will be determined as described by Blake and Hartge (1986). Soil compaction will be measured using a penetrometer (Eijkeamp Agrisearch Equipment, The Netherlands) several times a year to capture contrasting soil moisture levels.

Plant N and Biomass Accumulation. To estimate mineralized N available to the grass sward, above- and below-ground plant material will be sampled from randomly selected quadrants and total N determined. These data will be compared with temporal soil N and mineralization process data to determine relationships between soil N availability, plant uptake, and various soil physical parameters. Plant growth stage will be recorded throughout the season. Plant material will be ground using a Tecator Cyclotec 1093 sample mill and analyzed for total N using a Perkin Elmer 2400 Series II CHNS/O analyzer.

N Leaching. Nitrate-N and ammonium-N leached from the major root zone (0-30 cm) will be captured using suction cup lysimeters installed at approximately 60 cm below the soil surface. Water samples will be analyzed for nitrate-N and ammonium-N as described above.

APPROACH AND METHODOLOGY FOR HYPOTHESIS *6*. Watershed-wide monitoring will reveal where conservation intervention is most needed.

Watershed monitoring of sediment and nutrients. Temporal and spatial changes in water quality with regard to sediment (suspended solids) and insoluble and soluble nutrients will be determined for the Union Slough sub-watershed. Water sampling will occur at fifteen pre-selected sites that are geographically distributed across 40 km of hillslope and valley floor geomorphic and land management conditions. Surface waters will be sampled based on storm and irrigation events. Water samples will be analyzed for soluble and suspended solid bound nitrate-N, ammonium-N, ortho-phosphate, total phosphate, as well as sediment solid mass as described by Horwath et al. (1995). Surface water turbidity will be measured immediately after sampling using a Hanna portable turbidity meter.

APPROACH AND METHODOLOGY FOR HYPOTHESIS 7 (PROPOSAL TASK 4)

A private landowner Conservation Decision-Assistance Tool will allow the farmer or rancher to review the economic and environmental impact of selected agricultural and conservation practices while the program determines the relative economic and conservation values of different conventional and alternative conservation systems and evaluates their cost/benefit ratios. The State of Idaho OnePlan development team will provide the Idaho OnePlan Conservation Planning Tool templates to facilitate development of the Yolo OnePlan tool using soil, climate, and resource data specific to Yolo County, California. USDA-ARS will subcontract with Oregon State University to develop OnePlan concept framework, prescribe end product requirement, analysis of existing system economic and conservation impact assessment components compatibility, integration design strategies, architecture for integrating system components, incremental programming and beta testing.

The USDA-ARS Crop Rotation Economic and Environmental Impact Decision Aid (CREEDA) will research the site-specific impacts of conventional and alternative conservation practices in multiple-year crop rotation sequences. All resource analysis output from CREEDA (described below) will be made compatible with the Yolo OnePlan. In addition, CREEDA will be integrated with the OnePlan planning tools which will give farmers, ranchers, and conservation planners access to additional estimations of the farm-level effects when choosing the best practices to implement on a specific farm.

Presently, CREEDA allows simultaneous economic and environmental impact analysis of site specific farming practices using the ProCosts budget generator (USDA-NRCS, 1999), Revised Universal Soil Loss Equation (RUSLE) (USDA-ARS, 1997), and the Soil Conditioning Index (SCI) (USDA-NRCS, 1997). Modifications to CREEDA will specifically address resource management problems specific to the Union School Slough watershed project. Proposed component modifications include incorporation of: (i) the Surface Irrigation Soil Loss (SISL) model, which estimates erosion caused by irrigation and further considers impacts of conservation practices, (ii) the Windows Pesticide Screen Tool (WinPST) model that estimates the fate of pesticides to surface and ground water, and a nutrient management tool for nitrogen and phosphorus. A component will also be developed to allow automated CREEDA and Soil and Water Assessment Tool (SWAT) analysis of site-specific data from multiple fields in farms and ranches in the watershed so the integrated impact of all farms in the watershed implementing appropriate conservation practices can be estimated. All programming of these computer tools is being done with Microsoft Development Tools (MSDT) and utilizing COM/DCOM, C++, Visual Basic, and SQLServer software. This multi-tiered platform allows complete compatibility between the different applications and provides the ability to link the decision making tools with other tools that may be

desired for use in the future. This platform also allows flexibility for use of different user interfaces with making changes to the basic architecture of the planning tool. In this way custom user interfaces can be provided for different users (e.g., farmers, ranchers, conservation planners, and researchers) through the world wide web using popular browser platforms including Netscape and Microsoft Explorer. The RCD has already developed USDA-NRCS conservation effects worksheets on the major types of agriculture in the county and these will be used to expand the OnePlan as a viable tool for any landowner in the county. Also, the MSDT multitiered platform allows individual program components *to* be updated or modified without affecting existing users interfaces or other existing application tools.

Representative farms in the Union School Slough Watershed will be surveyed to determine the range of conventional practices used to farm. This information will be utilized by the OnePlan/CREEDA assessment tool to determine the impact of conventional farming practices on natural resource quality. Data obtained from field research assessing impacts of conservation practices on mitigating off-site effects from farming practices, will be analyzed to validate the planning tool and determine the impact of implementing conservation practices in the watershed.

2 f. Work Schedule

Site Establishment. All sites were established and instrumented in the fall 1999 and winter of 2000. Preliminary data at the site has been collected from October 1999 to present.

Soil erosion, suspended solids, and nutrients. Quantification of sediment and nutrient accumulated by silt traps will begin the first year of funding and continue for duration of the grant. Silts traps were established in 1999. Preliminary data in the establishment year has already been collected by USDA-ARS, Corvallis, OR.

Nitrogen (N) and Carbon (C) Cycling. *In situ* mineralization-nitrification-immobilization, soil gravimetric soil moisture, soil microbial biomass, microbial C, total soil organic matter C, soil pH, and redox experimentsimeasurements will be conducted approximately nine times a year for three years beginning at the start of funding.

Soil Abiotic Factors. Soil water retention curves and soil bulk density will be generated from each site in Year-1 and Year-3 the study. Soil compaction will be determined several times (at least four) each year for three years.

Plant N and Biomass Accumulation. Below- and above-ground plant biomass will be sampled each year for three years when the major grass species are at peak flowering. Total plant biomass accumulation data will be collected annually for each crop at peak flowering.

N Leaching. Water samples will be taken from suction cup lysimeters at least nine times per year for three years. Preliminary monitoring began in 1999 by USDA-ARS, Corvallis, OR.

Watershed monitoring of sediment and nutrients. Watershed monitoring will begin the first year of funding and continue through the third year. Preliminary monitoring began in 1999 by USDA-ARS, Corvallis, OR and will continue through the duration of the grant.

HYPOTHESES, DATA, AND KNOWLEDGE GAINED AS RELATED TO CALFED GOALS AND UNCERTAINTIES

Hypothesis	*Data needed*	*Substantial improvement in knowledge*	*CALFED Goal (G) or Uncertainty (U)*
1. It is possible to design a scientifically valid streamlined method of watershed assessment. (corresponds to ARS hypothesis H6)	Set of data: hydrology, NIS and beneficial species, soils, sediment & nutrient loads.	Data on which to base sound remedial practices. Which landowners need what assistance.	U# 12: Beyond the riparian corridor G#1: At-risk ssp G#4 Habitats G#5: NIS G#6 Sediment & Water Quality
2a. Irrigation Tailwater capture systems reduce sediment and nutrient load of water moving into Delta watenvays (corresponds to ARS hypothesis H1a)	sediment and nutrient load of runoff water	Statistically relevant and extendable data regarding tailwater/ sediment capture systems on irrigated ag systems	U#12: Beyond the Riparian Corridor G#6 Sediment & Water Quality
2b. A vegetated tailwater pond provides improved wildlife habitat in an agricultural landscape.	Wildlife use of established vegetated tailwater ponds	Relevant and extendable data regarding wildlife use of tailwater ponds	U#12: Beyond the Riparian Corridor G#4: Habitats G#1: At-Risk Spp
2c. Sediment and nutrients flowing off farmland are reduced by use of sediment traps along USS (corresponds to ARS hypothesis H1a)	Amount of sediment & nutrients leaving fields, trap design, volumes	Inexpensive remedies exist that remove sediment from the water systems and allow soil reuse	U#12: Beyond the Riparian Corridor G#6 Sediment & Water Quality
2d. Hedgerow Buffer Corridors (HBC) can replace riparian restoration, in some cases, providing wildlife habitat and water quality benefits	soil/plant/crop combinations that support HBC's. Wildlife use of *HBC's*. Water quality samples. NIS plant removal methods prior to planting. Habitat quality evaluations	HBC design criteria. Conditions under which HBC's can replace riparian restoration efforts. Cost analysis. How **HBCs** may suppress NIS re-invasion	U#12: Beyond the Riparian Corridor G#1: At-Risk Spp. G#4: Habitats
3a. Vegetating stream and canal banks with native species can reduce bank erosion while suppressing noxious weeds	Monitoring of bank slips and vegetation on comparable but differently treated reaches of streams and canals	Can substantiate water quality, reduced NIS control, habitat value of vegetated banks in a non-riparian setting.	U#12: Beyond the Riparian Corridor G#4: Habitats G#5: NIS G#6 Sediment & water Quality
3b. Upland fallow land management techniques such as conservation tillage and cover crops not only reduce winter runoff but improve the quality of water leaving the field	Winter runoff water quality (sediment & nutrients) measurements, planted vs bare	Statistically relevant and extendable data regarding water quality improvements associated with cover crops and conservation tillage	U#12: Beyond the Riparian Corridor G#6: Sediment & Water Quality
3c. Vegetated canal banks and *HBC's* provide improved wildlife habitat and use	Wildlife species using vegetated and non-vegetated areas. Habitat	Substantiation of wildlife use differences. Refinement or validation of current practice	U#12: Beyond the Riparian Corridor G#1 : At-risk species

compared to non-vegetated sites	quality evaluations	design to feed into outreach and adaptive management decisions.	G#3: Harvestable species G#4: Habitats
3d. Non-native Invasive Plant species can be controlled with careful management including suppression with native plant - species	Monitoring vegetation before and after removal of NIS and replanting with natives. Surveys of existing NIS populations and their spread	Documented methods and species most effective at controlling and out-competing NIS	U#12: Beyond the Riparian Corridor G#1: At-risk species G#3: Harvestable species G#4: Habitats G#5: Non-native Invasive Species
3e. A private land, web-based Conservation Decision-Assistance Tool, populated with local watershed and farming data will allow landowners to plan farming operations that meet water quality and wildlife goals (corresponds to ARS hypothesis H7)	Watershed assessment, wildlife, water quality, permitting, planning, design, implementation funding opportunities. Landowner reactions to draft plan	A broadly available technique for streamlined, integrated, confidential, conservation planning on private lands and for tracking watershed data	U#12: Beyond the Riparian Corridor -Environmental Education -Local Watershed Stewardship
4. Education & outreach efforts, including hands-on field demonstrations of practices, results of projects, and web-site, enhances landowner adoption	Survey of conservation practices planned or installed in county at beginning and end of project	Further sense of rate and quality of diffusion of innovations in private land conservation and effectiveness of hands-on outreach methods	U#12: Beyond the Riparian Corridor -Environmental Education -Local Watershed Stewardshiu

TASK 3: MONITORING CONSERVATION EFFECTS - PROTOCOLS

Contours of sediment traps (and 1st stage of 2-stage ponds) will be measured post-installation, after the imgation season, and prior to the beginning of the next irrigation season, using the NRCS Total Station to determine starting and ending dimensions and volume. These dimensions will allow calculation of volume of sediment trapped. Additional calculation, using soil density characteristics, will allow calculation of tons per acre of sediment trapped. (Task *3.3* and 3.4)

Uniform volume water samples will be collected from above and below sediment trap or above within and below exit of pond.. Sediment samples will be filtered, filtrate air-dried, and weighed (tare weight subtracted) to determine sediment per unit volume of water. Concurrent water flow rates will be taken (ref 1, pp 91 - 93) (Task 3.3 and 3.4)

Water samples will be analyzed for nutrients through a commercial analytical laboratory; sample collection will be according to laboratory-specified protocol (ref. 2)(Task 3.3, 3.4)

Slough and/or canal bank stability will be evaluated using a Weighted Category evaluation system adapted to streambanks: Categories of soil/bank erosion are designated, as below, using specific descriptive parameters equivalent to total volume of soil lost into waterway. At specified stream/bank reach, field evaluations are made according to erosion category. Tallied data will be used to determine total number of slips in each erosion categories over an extended reach. A single, weighted erosion value for the same reach can subsequently be calculated. (Task 3.5, 3.6 and 3.7)

Category -→	1*	2*	3*	4*	5*
Location					
A					
B					
C					
D					

- -1 = <1 cu. Ft. soil loss into waterway, due to sheet/rill erosion
- -2 = small gully eroding into stream bank, equivalent to between (1ft.') 0.5' x 0.25' x 8' and (*I* ft^3) 1' x 0.5' x 8'
- -3 = slump in bank equivalent to between *5* ft.^{3} (3' x 3.3' x 0.5') and 10 ft.^{3} (3' x 3.3' x 1')
- -4 = slump in bank equivalent to between 11 ft.^{3} (3' x *3.4'* x 1') and *20* ft.^{3} (3' x *5'* x 1.3')
- -*5* = slump in bank equivalent to greater than 20 ft.' (3' x *5'* x 1.5')

Treatments for canal and stream banks will be randomized within pairs, and dong reaches, if possible, (some, non-randomized sites already established, some to be established through the previously funded Union School Slough Program) to reduce variability, and results analyzed using a Paired-T test. As appropriate, preliminary samples will be taken to determine variability, using Stein's procedure to calculate the appropriate number of samples to be taken along the reach. (Task 2.5, 2.6, and 3.7).

Effectiveness of NIS (weed) reduction and establishment of native plant species will be monitored using a combinations of methods: Random quadrat counts will be taken pre-treatment and at least 2 times per year post-treatment, using either 1 ft.^{2} or 1 m^2 quadrats, depending on plant density and size (ref 1, 8). Where larger plants have been established, individual plant survival will be noted and mapped. (Task 3.5) Vegetation monitoring will be overlaid against soil type/location.

Habitat quality will be assessed using habitat evaluation criteria from U.S. Fish and Wildlife Service, Calif. Dept. of Fish and Game, and/or US EPA for specific species of concern to CALFED and identified as potentially occurring in the Willow Slough Watershed. (Task 3.7)(ref.5)

Species include: Valley Elderbeny Longhorn Beetle, Swainson's Hawk, California Tiger Salameander, Western Spadefoot Toad, California Red Legged Frog, Western Pond Turtle, Giant Garter Snake, Neotropical Bird Guild, Migratory Waterfowl.

Wildlife use of project sites will be monitored using a variety of approaches (see below), as appropriate to site and class (bird, mammal, insect, etc). Where paired sites are available, separate observations will be taken for each component pair and analyzed using a Paired-T test. (Task 2.3, 2.4, 2.5, 2.6)

Spring bird nesting surveys will be completed, with seasonal use-surveys at least twice per year. (Task 2.3, 2.5, 2.6)

Bird (including waterfowl) use Point Counts will be conducted (replicated over time) at least 2 times per year. (Task 2.3, 2.5, 2.6). (ref. 3)

Systematic surveys for mammal and reptile use (sightings, tracks, fur, scat, nest, mound, and other sign) will be completed at least twice per year, using consistent times of day and walking patterns. Track casts will be taken as appropriate and sign collected for positive identification. (Task 2.3, 2.5, 2.6)

Baited mammal track stations will be set at least twice per year at ponds, canals and slough project sites, but will not be included in the Paired-T tests. (Task 2.3, 2.5, 2.6)(see ref. Special notes)

Reptiles will be monitored using a time-constraint (T-C) count/search method at least 2 times per year (replicated over time). (Task 2.3, 2.5, 2.6)(ref 6).

Amphibians will be monitored using a time-constraint (T-C) count/search method and by call at least 2 times per year (replicated over time). (Task 2.3, 2.5, 2.6)(ref. 6)

Insects will be monitored using standardized sweep-net counts (see ref. Special notes) and yellow sticky cards (ref 7) at least 2 times per year (Task 2.3, 2.5, 2.6)

Valley Elderberry Longhorn Beetle presence will be monitored by direct observation or exit-hole searches on mature Elderberry plants in established project hedgerows. (Task 3.8)

TASK 3 AND ARS FARMLAND WORKPLAN CITATIONS

MONITORING CONSERVATION EFFECTS – TASK 3

1. "How to" Monitor Rangeland Resources. 1995. University of California Cooperative Extension, Div. Of Agriculture and Natural Resources, Intermountain Workgroup Publication 2.

2. A & L Western Agricultural Laboratories, Modesto, California

3. Volunteer Monitoring protocols, A Reference Guide for Monitoring California Rivers, Streams, and Watersheds, Stream Inventory Project: Avian Resource Survey (12pp). 199_. San Francisco Estuary Institute.

4. Ron Cole (museum curator, retired, Dept. Wildlife, Fish and Conservation Biology, UC Davis), personal communication. Adaptation of several combined techniques, to facilitate collection and storage of tracks for later identification, teaching, and display.

5. CALFED 2001 ERP-PSP.

6. Bury, R. Bruce, and Martin *G.* Raphael. 1983. Inventory Methods for Amphibians and Reptiles. Pages 416 - 419 in J. F. Bell and T. Atterbury (eds). Renewable Resource Inventories for Monitoring Changes and Trends. Proceedings of an International Symposium. Society of American Foresters. SAF 83-14. Corvallis, Oregon.

7. Long, Rachael (UCCE Farm Advisor). Personal communication.

8. Elzinga, Caryl L., et.al. 1998. Measuring and Monitoring Plant Populations. U.S. Dept. Interior, National Applied Resource Sciences Center, BLM Technical Reference 1730-1, Denver, Colorado

Special Notes:

Baited Track Stations:

[Baited track stations consist of a 2ft. x *2* ft. plywood board covered with white contact paper (sticky side up), with a can of bait (cat food) placed in the center. The track board is placed at a selected location in the evening, usually along a wildlife trail or near water. A minimum *2* ft. area surrounding the track board is cleared of vegetation and sprinkled lightly with colored contractors chalk-line chalk. The track station is checked the following morning for prints. Contact paper with tracks is covered with clear plastic wrap and collected for positive identification and storage.] (ref. 4)

Sweep Net Counts:

Standardized sweep net counts consist of 10 consecutive 180° arc sweeps per location, at multiple locations, done at a slow walk through vegetation being monitored. Insects may be identified and counted on site, or collected in vials orjars for later ID.

Yellow Sticky Cards:

Yellow sticky cards are hidden in vegetation to he monitored for *7* to 14 days. Cards are collected, covered with clear plastic wrap or inserted into a ziploc bag and refrigerated for later insect identification.

Additional Supporting References:

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Monitoring California's Annual Rangeland Vegetation. UC Cooperative Extension, Div. Of Agriculture and Natural Resources Leaflet 21486.

Sediment Total Maximum Daily Load (TMDLs) Inventory and Monitoring. Center for Range and Forested Ecosystems Methodology

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UNION SCHOOL SLOUGH WATERSHED IMPROVEMENT PROGRAM

The Union School Slough Watershed Improvement Program, initiated in April of 1999, has completed it's first of three years of funding through the CALFED Bay Delta Program. Approximately $230,000 of the $636,000 budget has be expended to date. The program has provided, and will continue to provide, direct technical and financial assistance to individual landowners in the Union School Slough watershed to implement the following conservation activities on their land.

Upper watershed riparian restoration: The program team is working with a participating ranchland owners to develop and implement a restoration project for an approximately one mile reach of slough in rangeland in the upper watershed area. A fence has been erected to facilitate optimal grazing within the approximately 50-acre riparian pasture. Select areas were planted with native riparian trees and shrubs during Fall and Winter of 1999, and additional areas will be planted Fall of 2000. In addition, we have experimented with erosion control methods using biotechnical materials on several gullies and streambanks within the riparian zone.

Upper watershed rangeland restoration: The program team is working with cooperating landowners and the California Department of Forestry (CDF) to execute prescribed burns in grassland areas in the upper watershed to control noxious rangeland weeds, such as medusa head, goat grass, and star thistle. We have successfully burned approximately 300 acres during our first year. Our goal under the currently funded program is to bum an additional 700 acres within the next two years. The success of this activity for managing rangeland weeds and improving forage quality has resulted in a high level of interest among watershed ranch managers and landowners.

Under the current program, we have worked with a cooperating landowner to seed approximately 200 acres of rangeland with native perennial grasses. As additional funding through our currently-funded program is not available for native grassland restoration, next-phase funding will allow us to work with watershed landowners to expand this activity. Our current 200-acre site now provides a unique opportunity to monitor and assess our restoration techniques and benefits of native perennial grassland systems.

Construction of tailwater ponds: The Natural Resources Conservation Service and the Yolo RCD have developed a simple double-pond tailwater system that can be easily managed with a back-hoe and does not require permits. The ponds trap sediment from row crop irrigation tailwater and provide wildlife habitat. During our first year of the program, we have installed one pond. We expect to install an additional 4 additional ponds will be installed over the next two years with the funding available. The Yolo RCD is proposing utilize these pond sites as part of their monitoring and assessment program proposed under the 2001 CALFED solicitation process.

Revegetation of irrigation canals and drainage ditches: The Yolo RCD has developed a method for establishing native vegetation, including native grasses, sedges, and rushes, on canal and ditch banks to reduce erosion and long-term maintenance requirements. We have worked with a particating landowner and the Yolo County Flood Control and Water Conservation District to establish plantings on an approximately 1000-foot section of irrigation canal. Activities have included reshaping and preparing soils along banks, establishing native vegetation, and controlling weeds. The Yolo RCD is proposing to tilize this project site as part of their monitoring and assessment program proposed under their "Sustaining Agriculture and Wildlife Beyond the Riparian Corridor."

Lower watershed riparian enhancement: The project team has been working with a participating landowner to enhance riparian habitat on an approximately ½-mile section of Union School Slough in the lower watershed area. Project approvals by regulatory agencies are almost complete, and implementation of the project will begin in June. The project will include removing exotic species (e.g. Himalayan blackberry, giant reed, annual weeds), excavating a 30-foot-wide floodplain bench along one side of the slough, revegetating the bench and slough banks with native riparian species. The Yolo RCD is proposing to utilize this project site as part of their monitoring and assessment program within their "Sustaining Agriculture and Wildlife Beyond the Riparian Corridor" 2001 CALFED proposal.

Landowner outreach, training and technical support

The program team has been very successful at providing coordination and communication among landowners in the watershed, and organizations and agencies that have been able to provide assistance. To date, the program team has coordinated dozens of individuals and agencies who have provided technical support, and in-kind contributions to the program.

In our first year we have held four training workshops for watershed landowners. Two workshops were cosponsored with the California Native Grass Association on prescribed burning and restoration with native grasses; and two others were cosponsored with the Yolo RCD on construction tailwater ponds and riparian enhancement on sloughs. No additional funding for workshops is available through the current-program. Next-phase funding will allow us to hold additional landowner training workshops focused on watershed conservation and restoration activities.

Cost-share funding

The program team has received substantial cost-share funding for supporting and expanding the current program (see Section F.2 of the proposal). We have received additional grant funding from the National Fish and Wildlife Foundation and the Department of Fish and Game's Wildlife Conservation Board to expand our work with ranchers in implementing riparian and rangeland enhancement activities. We are in the process of applying for various other grants, and have facilitated applications to the NRCS Environmental Quality Incentives Program for four Union School Slough watershed landowner participants.

Monitoring and assessment

A Quality Assurance Program Plan (QAPP), which describes the data collection and monitoring protocols for the current program, has been approved by U S . Environmental Protection Agency. However the monitoring and assessment of the conservation and restoration activities described above has been limited as a result of restricted funding for these aspects of the program. Next-phase funding will allow us to greatly expand on our monitoring and assessment program for upper and lower watershed rangeland activities, utilizing project sites already implemented under the current program, and additional project sites to be implemented under the next-phase of the program.

WILLOW SLOUGH RANGELAND STEWARDSHIP PROGRAM

B. Executive Summary

Title **of** Project: Willow Slough Watershed Rangeland Stewardship Program
Amount Requested: $1,800,668 Applicant Name: National Audubon Society – California
Address: 555 Audubon Place, Sacramento, CA 95825 Phone: (916) 481-5332 FAX: (916) 481-6228
E-mail of Primary Contact(s): dtaylor@audubon.com
Participants and Collaborators: Rangeland landowners of Willow Slough Watershed, Yolo County Resource Conservation Service, Natural Resources Conservation Service, Michigan State University, U.C. Cooperative Extension, University of California at Davis, USDA Agricultural Research Service.
Project Location: Inner Coast Range foothills of the Willow Slough Watershed, Yolo County.
Project Objectives: To develop an expanded watershed stewardship program to enhance and restore riparian, and grassland habitats, improve forage quality, improve water quality and reduce erosion.
Approach: To build on existing relationships with ranchers forged through our previous CALFED contract to implement recommendations of the Willow Slough Integrated Resources Management Plan, while expanding research and monitoring efforts to **1)** test the assumptions on which watershed objectives are based and **2)** provide environmental and economic data to allow an adaptive management approach.
Hypotheses: Together with our research subcontractors, we will test or evaluate a total of ***36*** hypotheses derived from the assumptions upon which Willow Slough watershed objectives are based — and which form the main tenets of this project's conceptual model. These are that: **1)** successful implementation of conservation and restoration practices is best achieved through a community-based watershed stewardship program; and **2)** conservation and restoration practices on ***individual*** farms and ranches will increase biodiversity and quality habitat for wildlife, improve water quality, control invasive non-native plants, and sustain the economic conditions for agriculture. The individual hypotheses are listed in Tables **2** and **3.**
Uncertainties Involved: This project addresses ERPP uncertainties related to "Beyond the Riparian Corridor" by focusing on agricultural (rangeland) conservation and wildlife-friendly rangeland practices. Expected Outcomes: **1.** An ongoing, landowner-driven, rangeland stewardship group, **2.** At least 2 ranch-wide conservation plans, including prescribed grazing plans; **3.** Implementation of conservation and restoration activities, including: 1200 acres of prescribed burning, restoration of 200 acres of native perennial grassland, 3 miles of riparian fencing and revegetation, erosion control demonstration projects using bioengineering, and enhancement of stock' ponds for wildlife; **4.** Assessment of range and habitat condition and species distribution using remote sensing technology; **5. A** web-based decision-support tool for landowners **6.** Identification and assessment of resource needs for rangeland stewardship, including conservation easements, restoration loan funds, and a working "grassbank"; **7.** Research and monitoring on a) the palatability and nutritional value of native perennial grasses; b) effectiveness of grassland restoration techniques; c) soil, plant, and avian response to grassland and riparian restoration projects; and d) factors that influence landowner participation in watershed stewardship.
Applicability to CALFED ERP Goals: **1.** achieve the recovery of at-risk native species, by improving habitat values in rangelands (grassland and riparian areas) for migratory birds, the valley elderberry longhorn beetle, California Swainson's hawk, California tiger salamander, western spadefoot toad, western pond turtle, giant garter snake; **3.** maintain and enhance populations of selected species for sustainable commercial and recreational harvest, by improving habitat values for Central Valley upland game species and migratory waterfowl; 4. restore functional habitat types, especially riparian and perennial grassland habitats on rangelands

for public values; 5. reduce the negative biological and economic impacts of non-native species on riparian and grassland habitats; and *6.* improve and maintain water quality by reducing erosion on rangeland and sediment delivery to watershed waterways.

PUBLICATONS AND PRESENTATIONS

Toshimi Minoura – Oregon State University

Doohun Eum, Pomsiri Muenchaisri, Ravi Bella, and Toshimi Minoura, "Selling and Buying in a Distributed Virtual Market Place." International Conference on Parallel and Distributed Processing Techniques and Applications, 2000, to appear.

Pomsiri Muenchaisri and Toshimi Minoura. "Entity-Relationship Software Development Environment." Proc. Tools USA '99: Technology of Object-Oriented Languages and Systems, 1999.

Vikram Gundoju and Toshimi Minoura. "Distributed Observable/Observer: A Distributed Real-Time Object-Communication Mechanism." 1st Intl. Symp. on Object-Oriented Real-Time Distributed Computing, 1998.

Pomsiri Muenchaisri and Toshimi Minoura. "Software Composition with Extended Entity-Relationship Diagrams." USENIX Conference on Object-Oriented Technology and Systems (COOTS), 1996.

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Minoura, T., Pargaonkar, S., and Rehfuss, K. "Structural Active-Object Systems for Simulation." In Proc. Conf. on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA), 1993, pp. 338-355.

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K. Banasik, V.L. Finney, S. Needham, and R.A. Young 1993, Comparison Of The Lumped Parameter Models DR-USLE And SEGMO With The Distributed Model AGNPS: International Symposium On Runoff And Sediment Yield Modeling, Warsaw, Poland.

Finney, V. L. 1993, Using the Single Event Model AGNPS to Estimate Average Annual Sediment Yield from Lindero Canyon, California, USA: International Symposium On Runoff And Sediment Yield Modeling, Warsaw, Poland.

Finney, V.L. 1988, Sediment Variability Mark Twain Lake, Missouri: Hydraulic Engineering Proceedings of 1988 National Conference, HY DIV/ASCE, Colorado Springs, Colorado, pp. 944-950.

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RESEARCH WORK PLAN FOR FIELD-BASED RESEARCH ON SUSTAINING AGRICULTURE AND WILDLIFE BEYOND THE RIPARIAN CORRIDOR

USDA-ARS, Corvallis, OR, Yolo RCD, Southern Oregon University, UC Davis I.C.E., UC Davis Center for Integrated Watershed Science and Management

Problem.

Since approximately 25% of pollutants in rivers and 15% in lakes are sediments from agricultural land, factors that improve infiltration or reduce soil erosion and runoff contribute to protecting surface water non-point pollution (Baker and Laflan, 1982; Carey, 1991).

The Willow Slough Plan (1996) identified five principal erosion problems commonly occurring in the Willow Slough watershed sheet and rill, gully, streambank, and roadbank, and mass movement. The greatest source of sediment on the cropland (valley floor) was from sheet erosion on unvegetated cropland and streambank erosion. Aside from losing a valuable natural resource from fertile farmland, soil loss by erosion processes and the accompanying sedimentation creates costly field releveling and redredging of road and farm culverts. Estimated soil losses from irrigated fields in Yolo County can exceed 7,000 kg ha^{-1} or more (Rominger, personal communication). Farmers interviewed during the development of the Willow Slough Plan "were reluctant to substantially modify existing farming practices" (Willow Slough Plan, 1996). "Because the implementation of the plan was voluntary, alternative cultivation practices were sought that would provide flood control or other benefits without substantially disrupting existing farm activities" (Willow Slough Plan, 1996). Nowhere in the Willow Slough Plan was conservation tillage (no-till) practices recommended as an alternative conservation practice. It is well documented that implementation of conservation tillagepractices can provide substantial economic savings to farmers and be major soil erosion deterrent. Unfortunately, farmers are more reluctant to adopt new practices unless "proven" locally. In combination with conservation tillage, sediment traps constructed down slope on irrigated cropland can significantly reduced sediment loads to canals and streams. Aside from reducing soil loss, conservation tillage also enhances soil health and reduces nutrient loss off site.

Continued monoculture production with conventional tillage and residue removal will negatively impact environmental quality, natural resource conservation, and farm sustainability (Papendick et al., 1986). Tillage and residue removal increases soil erosion, reduces soil sequestered organic and inorganic N and C, and reduces the activity and diversity of biotic components within the soil ecosystem (Kennedy and Smith, 1995; Wander et al., 1995; Zelles et al., 1995).

The proposed site-specific analysis decision aid will integrate both economic and environmental impact assessment tools to evaluate complete crop rotation systems. The approach is unique and will use complete crop rotation sequence as the time-frame basis for the analysis and actual empirical results from research results to develop economic budgets for typical production systems used by farmers. The concept of cost-benefit evaluation of for alternative production systems has been done using simulated data (e.g., Kelly et al., 1996), but site-specific analyses based on research results are rare. The tool will not utilize a mechanistic model to simulate plant growth (e.g., EPIC: Jones, et al., 1991) and will be more robust than traditional enterprise budgeting methods (e.g., Cost and Return Estimator, USDA-SCS, 1988; and MBMS Enterprise Budget Generator, McGrann et al., 1986). It will evaluate production costs and returns using the Profits and Costs (USDA-NRCS, 1999) budget generator, and simultaneously assess elements of the USDA-NRCS SWAPA+H (Soil, Water, Air, Plant, and Animal plus Human) effects categories using various existing environmental impacts tools (e.g., RUSLE, SCI, and WinPST) for complete multiple-year crop rotations. The use of a multi-

tier component object platform is an emerging technological approach that overcomes difficulties found with other programming platforms by allowing relatively easy program and database updating without interfering with access by the user interface (Sessions, 1998). Data produced from these analyses will be used with other decision aid software (e.g., Eco-Easy, 1995) to make cost-benefit analyses of non-dollar-valued investments (Orth et al., 1998). Estimated economic impacts for state-wide production practice changes are available for Washington (WSU, 1997). Enterprise budget information is available in Oregon, but no information is available regarding the profitability of alternative grass seed and livestock production systems (OSU, 1989). Quantitative approaches integrating economic and environmental impacts of production systems are needed to assist decision makers and to help the agricultural community deal with multiple resource conflicts (Abdall and Kelsey, 1996).

1 c. HYPOTHESES TO BE TESTED IN THIS USDA-ARS WORK PLAN (NOTE: H 2 and 3 are part of Audubon-CA's Willow Slough Watershed Rangeland Stewardship Program proposal under the CALFED 2001 PSP – see ***Appendix*** 7 ***Willow Slough Rangeland Stewardship Plan - Executive Summary)***

The hypotheses numbering listed below are specific to this workplan

H 1a. Tailwater capture systems will reduce sediment and nutrient load of water moving into Delta waterways

H4. Upland fallow land management techniques such as conservation tillage and cover crops not only reduce winter runoff but improve soil quality and decrease off-site nutrient loading to streams.

H6. Watershed-wide monitoring will reveal where conservation intervention is most needed.

H7. A private landowner Conservation Decision-Assistance Tool will assess the economic and environmental impact of agricultural and conservation practices and determine the relative economic and conservation values of different conventional and alternative conservation systems and evaluate their costbenefit ratios.

2 b. Approach - Site and Treatment Descriptions: The effect of cover crop versus fallow (bare) furrows and conservation tilled ground versus conventionally tilled ground on the fate and transport of suspended sediment, nutrients, and volumetric measurements of winter storm runoff for 2-3 years (USDA-ARS Corvallis) will be conducted on a family farm located in Yolo County, CA. Fields of approximately 80 to 100 acres will be established, one using conventional and the other conservation methods of establishment and management. Conservation practices use no till crop establishment and cover crops, while conventional operations will use tillage and over winter fallow conditions. Both fields share the same soil series. Soil C and N transformation processes (e.g., mineralization and denitrification), soil erosion, and soil physical and chemical changes, will be studied to improve crop nutrient efficiency (e.g., optimal fertilizer inputs) and quantify off-site losses, and on-site N and C sequestration.

APPROACH AND METHODOLOGY FOR HYPOTHESIS 1A. Tailwater capture ponds will reduce sediment and nutrient loads in surface waters moving off-farm.

Soil erosion, suspended solids, and nutrients. Effects of field soil erosion and sediment (suspended solids) and water chemistry will be monitored using double-pond systems as specified by Robins (1999). Each field will have it's own trapping system. The first pond in series acts as a sediment trap that is designed for easy excavation of trapped sediment. Accumulated trap sediment will be quantified by subtracting the trap's final sediment volume from the initial trap volume without sediment. Sediment dry mass will be determined from sediment cores sampled from the trap. Sediment mass will be determined from oven dried samples. Total field soil erosion losses will be expressed as kg soil ha^{-1} yr^{-1}. Sediment core sub-samples will be analyzed for nitrate-N, ammonium-N, and total phosphorus as outlined by

Honvath et al. (1995). Total suspended solid mass and bound P and N will be determined from filtered samples taken from pond surface water using both ISCO automated collectors and by grab sampling as outlined by Horwath et al. (1995). Sampling of surface and shallow ground waters will be storm and irrigation event based. Shallow ground water will be sampled from TIEMCO PVC high flow piezometers and suction cup lysimeters placed along two transects in the field. Furrow and canal discharge will be estimated with a rating curve based on flow stage and discharge values calculated with Manning's equation (Albertson and Simons, 1964). Rating curve validation will be performed with flow measurements made with a Swoffer flow meter at varying stage heights up to bank full flow. Use of pre-calibrated flumes or weirs are not practical for this study site. Deep pyrometers will be installed and equipped with vented, Geokon vibrating wire pressure transducers. Campbell CRlO data loggers will capture data collected from these sensors every 10 minutes.

APPROACH AND METHODOLOGY FOR HYPOTHESIS 4. Upland fallow land management techniques such as conservation tillage and cover crops not only reduce winter runoff but improve soil quality and decrease off-site nutrient loading to streams.

Nitrogen (N) and Carbon (C) Cycling. Changes in N and C mineralization processes will be determined using an ***in situ*** buried bag method (Eno, 1960). Replicated incubations will be renewed every six weeks; nine per year. Briefly, an intact soil core will be removed, sealed within a zip-seal polyethylene bag, and replaced in its original position in the ground. A second core will be taken for determination for initial inorganic N (NO_3-N and NH_4-N) and C analyses. Sub-samples of soil will be taken for determination of soil moisture by gravimetric methods and soil microbial biomass. Soil biomass C will be determined using the chloroform fumigation extraction method described by Horwath et al. (1994). Total organic carbon will be quantified with high temperature catalytic combustion and infrared detection on a Rosemount/Dohrman DC-190. Soil pH will be measured using a glass electrode (1:2, soil: water ratio). Soil organic matter (total C) will be estimated using a loss on ignition method. Air and soil temperature and precipitation are factors that have been shown to affect N cycling and will be measured continuously using a Campbell Scientific data logger. Since nutrient cycling processes are governed to a large extent by soil oxidation and reduction characteristics, soil E_h will be measured with triplicate Pt electrodes installed at two depths (25 and 45 cm) along established. The electrodes will be read according to Austin (1993) on a high impedance voltmeter.

Soil Abiotic Properties. Within each of the three replicated quadrates in each restoration stage treatment, multiple soil cores will be sampled along transects and analyzed for water retention and soil bulk density. Soil water retention curves will be determined as described by Klute (1986) using a suction cell apparatus (Soil moisture Equipment Crop., Santa Barbara, CA). Water retention curves and bulk density will be performed in Year-1 and Year-3. Soil bulk density will be determined as described by Blake and Hartge (1986). Soil compaction will be measured using a penetrometer (Eijkeamp Agrisearch Equipment, The Netherlands) several times a year to capture contrasting soil moisture levels.

Plant N and Biomass Accumulation. To estimate mineralized N available to the grass sward, above- and below-ground plant material will be sampled from randomly selected quadrants and total N determined. These data will be compared with temporal soil N and mineraiization process data to determine relationships between soil N availability, plant uptake, and various soil physical parameters. Plant growth stage will be recorded throughout the season. Plant material will be ground using a Tecator Cyclotec 1093 sample mill and analyzed for total N using a Perkin Elmer 2400 Series II CHNS/O analyzer.

N Leaching. Nitrate-N and ammonium-N leached from the major root zone (0-30 cm) will be captured using suction cup lysimeters installed at approximately 60 cm below the soil surface. Water samples will be analyzed for nitrate-N and ammonium-N as described above.

APPROACH AND **METHODOLOGY FOR HYPOTHESIS *6*.** Watershed-wide monitoring will reveal where conservation intervention is most needed.

Watershed monitoring of sediment and nutrients. Temporal and spatial changes in water quality with regard to sediment (suspended solids) and insoluble and soluble nutrients will be determined for the Union Slough sub-watershed. Water sampling will occur at fifteen pre-selected sites that **are** geographically distributed across 40 km of hillslope and valley floor geomorphic and land management conditions. Surface waters will be sampled based on storm and irrigation events. Water samples will be analyzed for soluble and suspended solid bound nitrate-N, ammonium-N, ortho-phosphate, total phosphate, as well as sediment solid mass as described by Honvath et al. (1995). Surface water turbidity will be measured immediately after sampling using a Hanna portable turbidity meter.

APPROACH AND METHODOLOGY FOR HYPOTHESIS 7 (TASK 4)

A private landowner Conservation Decision-Assistance Tool will allow the farmer or rancher to review the economic and environmental impact of selected agricultural and conservation practices while the program determines the relative economic and conservation values of different conventional and alternative conservation systems and evaluates their cost/benefit ratios. The State of Idaho OnePIan development team will provide the Idaho OnePlan Conservation Planning Tool templates to facilitate development of the Yolo OnePlan tool using soil, climate, and resource data specific to Yolo County, California.

The USDA-ARS Crop Rotation Economic **and** Environmental Impact Decision Aid (CREEDA) will research the site-specific impacts of conventional and alternative conservation practices in multiple-year crop rotation sequences. All resource analysis output from CREEDA (described below) will be made compatible with the Yolo OnePlan. In addition, CREEDA will be integrated with the OnePlan planning tools which will give farmers, ranchers, and conservation planners access to additional estimations of the farm-level effects when choosing the best practices to implement on a specific farm.

Presently, CREEDA allows simultaneous economic and environmental impact analysis of site specific farming practices using the ProCosts budget generator (USDA-NRCS, 1999), Revised Universal Soil Loss Equation (RUSLE) (USDA-ARS, 1997), and the Soil Conditioning Index (SCI) (USDA-NRCS, 1997). Modifications to CREEDA will specifically address resource management problems specific to the Union School Slough watershed project. Proposed component modifications include incorporation of: (i) the Surface Irrigation Soil Loss (SISL) model, which estimates erosion caused by irrigation and further considers impacts of conservation practices, (ii) the Windows Pesticide Screen Tool (WinPST) model that estimates the fate of pesticides to surface and ground water, and a nutrient management tool for nitrogen **and** phosphorus. A component will also be developed to allow automated CREEDA and Soil and Water Assessment Tool (SWAT) analysis of site-specific data from multiple fields in farms and ranches in the watershed so the integrated impact of all farms in the watershed implementing appropriate conservation practices can be estimated. All programming of these computer tools is being done with Microsoft Development Tools (MSDT) and utilizing COM/DCOM, C++, Visual Basic, and SQLServer software. This multi-tiered platform allows complete compatibility between the different applications and provides the ability to link the decision making tools with other tools that may be desired for use in the future. This platform also allows flexibility for use of different user interfaces with making changes to the basic architecture of the planning tool. In this way custom user interfaces can be provided for different users (e.g., farmers, ranchers, conservation planners, and researchers) through the world

wide web using popular browser platforms including Netscape and Microsoft Explorer. The RCD has already developed USDA-NRCS conservation effects worksheets on the major types of agriculture in the county and these will be used to expand the OnePlan as a viable tool for any landowner in the county. Also, the MSDT multitiered platform allows individual program components to be updated or modified without affecting existing users interfaces or other existing application tools.

Representative farms in the Union School Slough Watershed will be surveyed to determine the range of conventional practices used to farm. This information will be utilized by the OnePlan/CREEDA assessment tool to determine the impact of conventional farming practices on natural resource quality. Data obtained from field research assessing impacts of conservation practices on mitigating off-site effects from farming practices, will be analyzed to validate the planning tool and determine the impact of implementing conservation practices in the watershed.

2 f. Work Schedule

Site Establishment. All sites were established and instrumented in the fall 1999 and winter of 2000, Preliminary data at the site has been collected from October 1999 to present.

Soil erosion, suspended solids, and nutrients. Quantification of sediment and nutrient accumulated by silt traps will begin the first year of funding and continue for duration of the grant. Silts traps were established in 1999. Preliminary data in the establishment year has already been collected by USDA-ARS, Corvallis, OR.

Nitrogen (N) and Carbon (C) Cycling. *In situ* mineralization-nitrification-immobilization, soil gravimetric soil moisture, soil microbial biomass, microbial C, total soil organic matter C, soil pH, and redox experimentsimeasurementswill be conducted approximately nine times a year for three years beginning at the start of funding.

Soil Abiotic Factors. Soil water retention curves and soil bulk density will be generated from each site in Year-1 and Year-3 the study. Soil compaction will be determined several times (at least four) each year for three years.

Plant N and Biomass Accumulation. Below- and above-ground plant biomass will be sampled each year for three years when the major grass species are at peak flowering. Total plant biomass accumulation data will be collected annually for each crop at peak flowering.

N Leaching. Water samples will be taken from suction cup lysimeters at least nine times per year for three years. Preliminary monitoring began in 1999 by USDA-ARS, Corvallis, OR.

Watershed monitoring of sediment and nutrients. Watershed monitoring will begin the first year of funding and continue through the third year. Preliminary monitoring began in 1999 by USDA-ARS, Corvallis, OR and will continue through the duration of the grant.

PROPOSAL HYPOTHESES, DATA, AND KNOWLEDGE GAINED AS RELATED TO CALFED GOALS AND UNCERTAINTIES

Hypothesis	*Data needed*	*Substantial improvement in knowledge*	*CALFED Goal (G) or Uncertainty (U)*
1. It is possible to design a scientifically valid streamlined watershed assessment.	Set of data: hydrology, NIS and beneficia1 species, soils, sediment & nutrient loads.	Data on which to base sound remedial practices. Which landowners need what assistance.	U#12: Beyond the riparian corridor G#1 : At-risk ssp G#4 Habitats G#5: NIS G#6 Sediment & Water Quality
2a. Irrigation Tailwater capture systems reduce sediment and nutrient load of water moving into Delta waterways	sediment and nutrient load of runoff water	Statistically relevant and extendable data regarding tailwater/ sediment capture systems on irrigated ag systems	U#12: Beyond the Riparian Corridor G#6 Sediment & Water Quality
2b. A vegetated tailwater pond provides unique wildlife habitat opportunities in an agricultural landscape.	Wildlife use on established vegetated tailwater ponds	Statistically relevant and extendable data regarding wildlife use of tailwater ponds	U#12: Beyond the Riparian Corridor G#4: Habitats G#1: At-Risk Spp? ~~G#3: Harvestable species?~~ ?
2c. Sediment and nutrients flowing off farmland is reduced by use of sediment traps along USS	Amount of sedimenr & nutrients leaving fields, trap design, volumes	There are inexpensive remedies that remove sediment from the water systems and allows soil reuse	U#12: Beyond the Riparian Corridor G#6 Sediment & Water Quality
2d. Hedgerow Buffer Corridors can replace riparian restoration, in some cases, providing wildlife habitat and water quality benefits	What combination of soils/plants/ag crops support hedgerow buffer corridors. What wildlife use them. How-tos on NIS plant removal	HBC design criteria. Under what conditions HBC can replace riparian restoration efforts. Cost analysis on HBCs. How HBCs may suppress **NIS** re-invasion	U#12: Beyond the Riparian Corridor G#1: At-Risk Spp. ~~G#3: Harvestable species~~ ? G#4: Habitats
3a. Vegetating stream and canal banks with native species can reduce bank erosion while suppressing noxious weeds	Monitoring of bank slips and vegetation on comparable but differently treated reaches of streams and canals	Can substantiate water quality, reduced **NIS** control, habitat value of vegetated banks in a non-riparian setting.	U#12: Beyond the Riparian Corridor G#4: Habitats **G#5: NIS** G#6 Sediment & water Quality
3b. Upland fallow land management techniques such as conservation tillage and cover crops not only reduce winter runoff but improve the quality of water leaving the field	Winter runoff water quality (sediment & nutrients) measurements, planted vs bare	Statistically relevant and extendable data regarding water quality improvements associated with cover crops and conservation tillage	U#12: Beyond the Riparian Corridor G#6: Sediment & Water Quality
3c. Monitoring wildlife use of all established vegetated sites	Which wildlife species use which practices and	Verification of current practice design, allowing for	U#12: Beyond the Riparian Corridor

will demonstrate what kind of use they are getting	what vegetation,	adaptive management and outreach	G#1: At-risk species G#3: Harvestable species G#4: Habitats
3d. Non-native Invasive Plant species can be controlled with careful management and suppression with native plant species	Monitoring vegetation after removal of NIS and replanting with natives. Surveys of existing NIS populations and their spread	Evidence that native-plant based wildlife habitat can be restored where NIS have previously compromised habitat	U#12: Beyond the Riparian Corridor G#1: At-risk species G#3: Harvestable species G#4: Habitats G#5: Non-native Invasive Species
4. A private land, web-based conservation Decision-Assistance Tool, populated with local watershed and farming data will allow landowners to plan farming operations that meet water quality and wildlife goals	Watershed assessment, wildlife, water quality, permitting, planning, design, implementation funding opportunities. Landowner reactions to draft plan	A technique for providing streamlined, confidential conservation planning on private lands and tracking watershed data	U#12: Beyond the Riparian Corridor -Environmental Education -Local Watershed Stewardship
5. Education & outreach efforts, including hands-on field demonstrations of practices and results, web-site of project, enhances landowner adoption	Survey of conservation practices planned or installed in county at beginning and end of project	Further sense of rate and quality of diffusion of innovations in private land conservation	U#12: Beyond the Riparian Corridor -Environmental Education -Local Watershed Stewardship

TASK 3: MONITORING CONSERVATION EFFECTS - PROTOCOLS

Contours of sediment traps (and 1st stage of 2-stage ponds) will be measured post-installation, after the irrigation season, and prior to the beginning of the next irrigation season, using the NRCS Total Station to determine starting and ending dimensions and volume. These dimensions will allow calculation of volume of sediment trapped. Additional calculation, using soil density characteristics, will allow calculation of tons per acre of sediment trapped. (Task 3.3 and 3.4)

Uniform volume water samples will be collected from above and below sediment trap or above within and below exit of pond.. Sediment samples will be filtered, filtrate air-dried, and weighed (tare weight subtracted) to determine sediment per unit volume of water. Concurrent water flow rates will be taken (ref 1, pp 91 - 93) (Task 3.3 and 3.4)

Water samples will be analyzed for nutrients through a commercial analytical laboratory; sample collection will be according to laboratory-specified protocol (ref. 2)(Task 3.3, 3.4)

Slough and/or canal bank stability will be evaluated using a Weighted Category evaluation system adapted to streambanks: Categories of soil/bank erosion are designated, as below, using specific descriptive parameters equivalent to total volume of soil lost into waterway. At specified stream/bank reach, field evaluations are made according to erosion category. Tallied data will be used to determine total number of slips in each erosion categories over an extended reach. **A** single, weighted erosion value for the same reach can subsequently be calculated. (Task 3.5, 3.6 and 3.7)

Category -→	1*	2*	3*	4*	5*
Location					
A					
C					
D					

- -1 = <1 cu. Ft. soil loss into waterway, due to sheet/rill erosion
- -2 = small gully eroding into stream bank, equivalent to between (1 ft.^{3}) 0.5' x 0.25' x 8' and (4 ft^3) 1' x 0.5' x 8'
- -3 = slump in bank equivalent to between 5 ft.^{3} (3' x 3.3' x 0.5') and 10 ft^3 (3' x 3.3' x 1')
- -4 = slump in bank equivalent to between 11 ft.) (3' x 3.4' x 1') and 20 ft.^{3} (3' x 5' x 1.3')
- -5 = slump in bank equivalent to greater than 20 ft.) (3' x 5' x 1.5')

Treatments for canal and stream banks will be randomized within pairs, and along reaches, if possible, (some, non-randomized sites already established, some to be established through the previously funded Union School Slough Program) to reduce variability, and results analyzed using a Paired-T test. As appropriate, preliminary samples will be taken to determine variability, using Stein's procedure to calculate the appropriate number of samples to be taken along the reach. (Task 2.5, 2.6, and 3.7).

Effectiveness of NIS (weed) reduction and establishment of native plant species will be monitored using a combinations of methods: Random quadrat counts will be taken pretreatment and at least 2 times per year post-treatment, using either 1 ft.^{2} or 1 m^2 quadrats, depending on plant density and size (ref 1, 8). Where larger plants have been established, individual plant survival will be noted and mapped. (Task 3.5) Vegetation monitoring will be overlaid against soil type/location.

Habitat quality will be assessed using habitat evaluation criteria from U.S. Fish and Wildlife Service, Calif. Dept. of Fish and Game, and/or US EPA for specific species of concern to CALFED and identified as potentially occurring in the Willow Slough Watershed. (Task 3.7)(ref.5)

Species include: Valley Elderberry Longhorn Beetle, Swainson's Hawk, California Tiger Salameander, Western Spadefoot Toad, California Red Legged Frog, Western Pond Turtle, Giant Garter Snake, Neotropical Bird Guild, Migratory Waterfowl.

Wildlife use of project sites will be monitored using a variety of approaches (see below), as appropriate to site and class (bird, mammal, insect, etc). Where paired sites are available, separate observations will be taken for each component pair and analyzed using a Paired-T test. (Task 2.3, 2.4, 2.5, 2.6)

Spring bird nesting surveys will be completed, with seasonal use-surveys at least twice per year. (Task 2.3, 2.5, 2.6)

Bird (including waterfowl) use Point Counts will be conducted (replicated over time) at least 2 times per year. (Task 2.3, 2.5, 2.6). (ref. 3)

Systematic surveys for mammal and reptile use (sightings, tracks, fur, scat, nest, mound, and other sign) will be completed at least twice per year, using consistent times of day and walking patterns. Track casts will be taken as appropriate and sign collected for positive identification. (Task 2.3, 2.5, 2.6)

Baited mammal track stations will be set at least twice per year at ponds, canals and slough project sites, but will not be included in the Paired-T tests. (Task 2.3, 2.5, 2.6)(see ref. Special notes)

Reptiles will be monitored using a time-constraint (T-C) count/search method at least 2 times per year (replicated over time). (Task 2.3, 2.5, 2.6)(ref 6).

Amphibians will be monitored using a time-constraint (T-C) count/search method and by call at least 2 times per year (replicated over time). (Task 2.3, 2.5, 2.6)(ref. 6)

Insects will be monitored using standardized sweep-net counts (see ref. Special notes) and yellow sticky cards (ref 7) at least 2 times per year **(Task** 2.3, 2.5, 2.6)

Valley Elderberry Longhorn Beetle presence will be monitored by direct observation or exit-hole searches on mature Elderberry plants in established project hedgerows. (Task **3.8)**

TASK 3 AND ARS FARMLAND WORKPLAN CITATIONS

MONITORING CONSERVATION EFFECTS – TASK 3

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5. CALFED 2001 ERP-PSP.

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7. Long, Rachael (UCCE Farm Advisor). Personal communication.

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Special Notes:

Baited Track Stations:

[Baited track stations consist of a 2ft. x 2 ft. plywood board covered with white contact paper (sticky side up), with a can of bait (cat food) placed in the center. The track board is placed at a selected location in the evening, usually along a wildlife trail or near water. A minimum 2 ft. area surrounding the track board is cleared of vegetation and sprinkled lightly with colored contractors chalk-line chalk. The track station is checked the following morning for prints. Contact paper with tracks is covered with clear plastic wrap and collected for positive identification and storage.] (ref. 4)

Sweep Net Counts:

Standardized sweep net counts consist of 10 consecutive 180° arc sweeps per location, at multiple locations, done at a slow walk through vegetation being monitored. Insects may be identified and counted on site, or collected in vials orjars for later ID.

Yellow Sticky Cards:

Yellow sticky cards are hidden in vegetation to be monitored for 7 to 14 days. Cards are collected, covered with clear plastic wrap or inserted into a ziploc bag and refrigerated for later insect identification.

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Attachments

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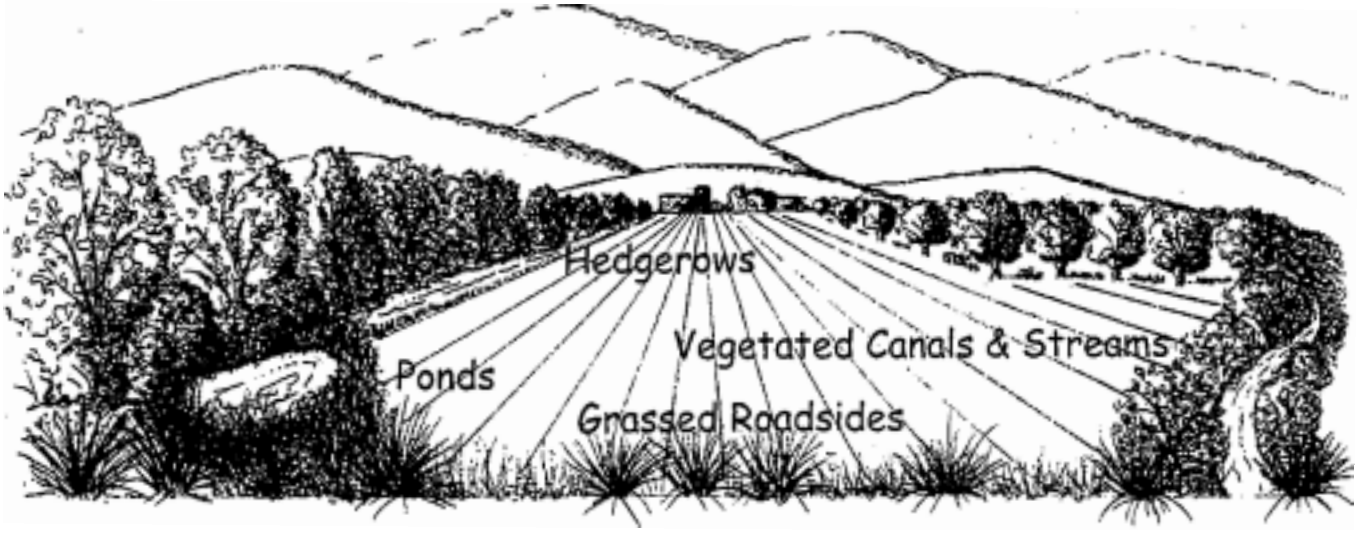
"Bring Farm Edges Back to Life"
Cover, Table of Contents, Order Form

Bring Farm Edges Back to Life!



How to Enhance Your Agriculture

and Farm Landscape

with Proven Conservation Practices

for Increasing the Wildlife Cover on Your Farm

Yolo County Resource Conservation District
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http://www.yolorcd.ca.gov/

Bring Farm **Edges** Back to **Life!**

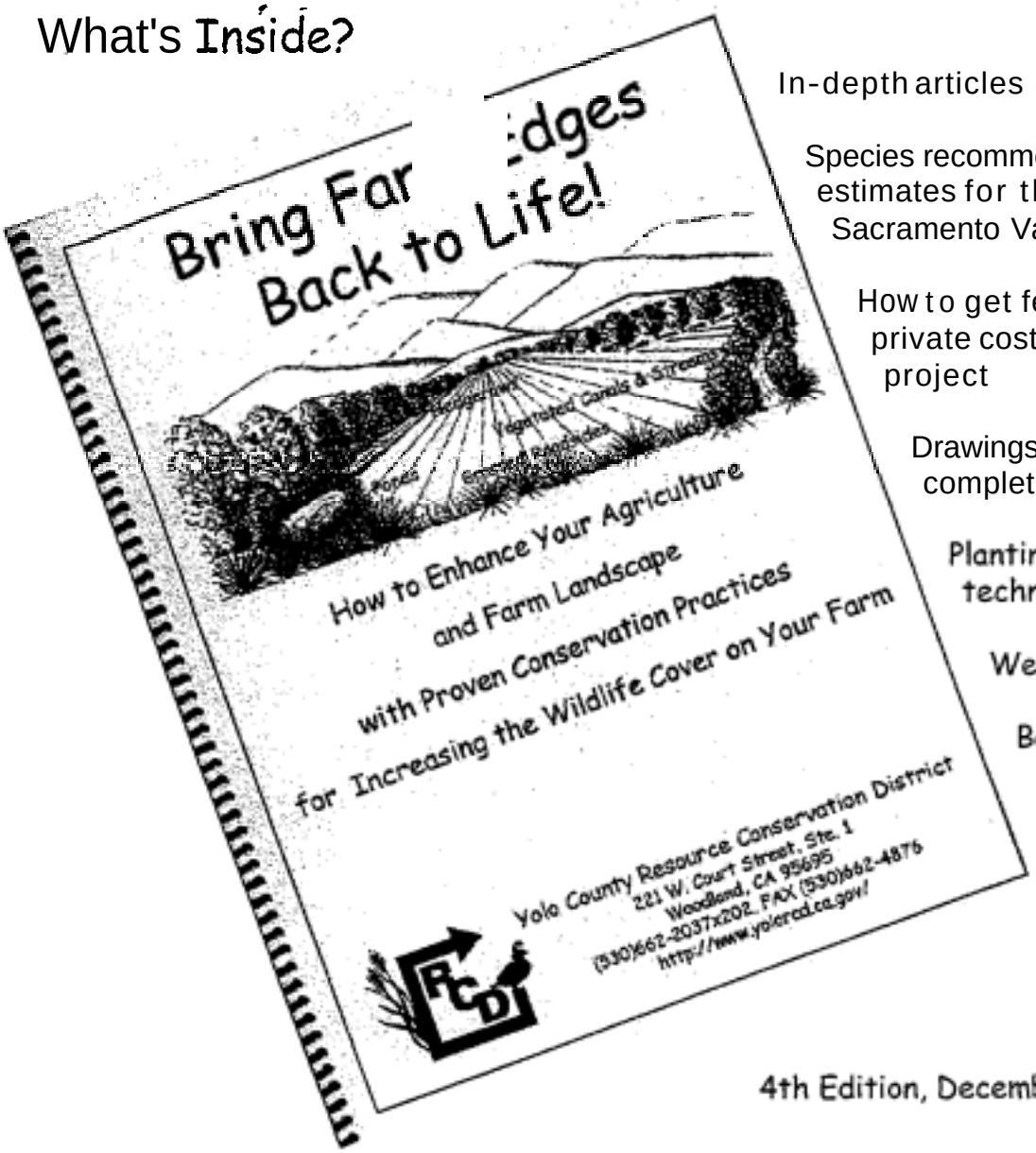
Table of **Contents**

Planting Techniques & Weed Control

Projecf Support

To learn more about the RCD, please call us or browse our website at http://www.yolorcd.ca.gov/. This site reflects a cooperative effort with our partner agency, the USDA: Natural Resources Conservation Service (NRCS).

What's Inside?



In-depth articles include:

Species recommendations and cost estimates for the Lower Sacramento Valley

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Drawings and photos of completed projects

Planting recommendations & techniques

Weed control techniques

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& More!

4th Edition, December 1999. 105 pages.

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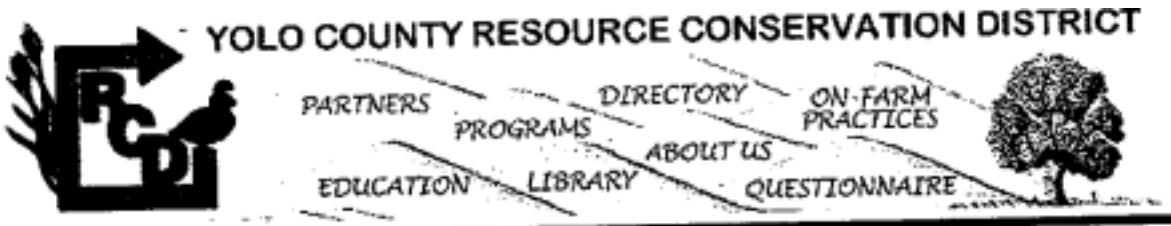

The Yolo County Resource Conservation District

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Site by Bizline Inc.

Vegetation That Makes Irrigation Canals Thrive

Photo by John Anderson, Yolo RCD

Typical Irrigation Canal

Problem: **Weeds, erosion, high costs of excessive spraying, chemical build-up, rebuilding banks, and loss of habitat.** Rampant noxious weeds threaten efficient water delivery, dump weed seeds into irrigation flows, and induce a never-ending spraying cycle. Some canal banks and berms are sprayed five times a year, thus denuding the area of all vegetation and increasing bank instability and erosion. Expensive bank rebuilding may be necessary and the whole process produces a desert landscape devoid of habitat and biodiversity.

Solution: **Sustainable native plant systems that control weeds, reduce spraying and canal bank erosion, and create unobtrusive habitat.** Replacing weeds, native grass and plant roots extend down 6'to 10', stabilizing banks while supporting water flows and cost-effective management goals. Once established, natives will not inhiiit flow but will out-compete weeds to reduce herbicide use and in-field invasions of weed seeds. Less erosion means less maintenance, less supplies, and less labor costs. Vegetation Wers excess nutrients while simultaneously adding biological diversity and attractive canal habitat.

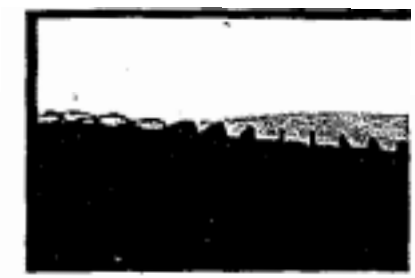
Photo by John Anderson, Yolo RCD

Canal revegetated using native grasses

TOPICS

[Hedeerows | Cover Crops | Ranee Manaeement | Canal Vegetation]
[Ponds | Roadside Veeetation | Slough Enhancement | Prescribed Fire | Weeds]

Discover Cover Crops: Benefits Beyond the Surface



Yolo RCD
Winter vineyard: soil eroding, annual weeds

Problem: Intensive farming expends the "asset" called soil, replacing value with vulnerability. Unhealthy **soil** suffers high **storm** erosion. loss of organic materials and vital organisms. Depleted organic material, plus the very fine surface "seal" after first irrigation or rain, cuts water percolation and holding capacity. Exhausted soil amplifies runoff - turning important nutrients, chemicals, and pesticides into serious downstream pollution problems. Costly synthetic fertilizers compensate for unhealthy soil, but then stimulate weed growth and pollution. Empty bare ground threatens other resources, diminishing crop-friendly habitat, the homes for beneficial insects and supportive life-forms.

Solution: Like a warm coat in a winter **storm,** cover crops keep the good in and keep the bad out. The multiple benefits of cover crops emerge when they're planted after harvest. Not only reducing bare areas, thus checking weed explosions and saving on mowing, carefully selected cover crops anchor the soil throughout the winter. That prevents soil, nutrient, and pesticide **runoff** while allowing unwanted chemicals to break down, be metabolized, and thus filtered **on** site.
Cover crop roots tunnel deep into the soil, allowing water to penetrate key root zones. Root growth below and green growth above supply organic matter, slowly and continuously breaking down into fertilizer, producing food for micro-organisms, and sponges that hold water. Suitable cover crop plants provide flower-nectar sources and hiding places for predatory insects that feed **on** crop **pests.**
In short, a family of cover crops provide a family of benefits to increase soil health- preserving the old while *adding* new nutrients, absorbing chemicals to clean irrigation water, controlling erosion, and harboring good bugs. Cover crops may grow near the surface but benefits extend up, down, and **across.**

Yolo RCD
Summer vineyard with covercrop

TOPICS

[Hedeemws | Cover Crow | Ranee Manaeement | Canal Vegetation]
[Ponds | Roadside Veeetation | Slouch Enhancement | Prescribed Fire | Weeds]

Hedgerows: A Traditional Idea with Real Payoffs

Fall Article

Photo by John Anderson, Yolo RCD
Bare roadside next to typical farm shop area

Problem: **Field borders and other non-crop farm areas are perfectly suited for weed infestations, and traditional methods invite a cycle of noxious growth.** The combination of spraying, disking or scraping clears the land of vegetation and thus encourages return by the most opportunistic invaders, the very pests you hoped to destroy. Borders and set-asides are expensive to maintain, cleaned areas erode faster, and IPM options for beneficial insects and predators are nill. Mechanical plus chemical controls are short-lived, labor costs are high, and injuries from accidents increase as terrain becomes steep, awkward, or inaccessible.

Solution: **Plant a farm-friendly native plant hedgerow - the traditional, multi - purpose buffer brings sustaining impacts to your farm.** Hedgerows provide an astonishing number of benefits, starting with weed control and reduction of weed seed banks in uncropped areas. Most important of all are IPM advantages. By providing insectory and wildlife habitat in areas of intensive agriculture, beneficial, pest-eating insects, reptiles, mammals and birds are established and maintained. Beginning the first year, native plant hedgerows blossom into a steady, recurring home for beneficial insects and pest predators. Hedgerow shrubs, trees, and grasses also anchor the *soil* with deep roots that control wind and water erosion, restricting sediment loss. If you can grow crops, you can grow hedgerows that support crop yields, add beauty to your farm, require little to no attention once established, protect against soil loss and spray drift, and capture excess nutrients and pesticides. Not bad for an idea as old as the hills!

Photo by John Anderson, Yolo RCD
Shop yard fence line with mature hedgerow

TOPICS

[Hedgerows | Cover Crops | Range Management | Canal Vegetation]
[Ponds | Roadside Vegetation | Slough Enhancement | Prescribed Fire | Weeds]

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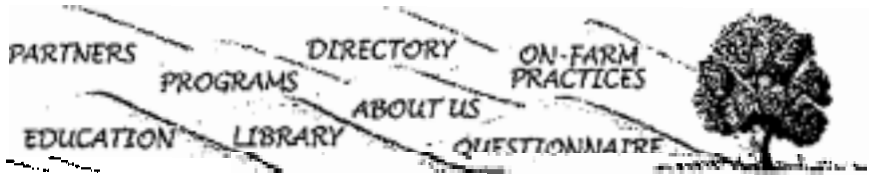

Practicing What We Preach: Sustainable Management that Works

Practice : _____

Move the cursor over the picture to locate the Practices hot spot. Its name will appear in the "Practice" box. To access the named practice page, click on the hot spot. Alternatively, click on the blue hyperlink in the Topics navigation list below.

TOPICS

[Hedgerows | Cover Crops | Range Management | Canal Veeetation]
[Ponds | Roadside Veeetation | Slough Enhancement | Prescribed Fire | Weeds]

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PARTNERS PROGRAMS DIRECTORY ON-FARM PRACTICES ABOUT US EDUCATION LIBRARY QUESTIONNAIRE

How to Enhance Roadsides, Save Money, and Reduce Spraying

Photo by John Anderson, Yolo RCD

Current roadside maintenance practice

Problem: **Noxious weeds are the predominant species on most of *our* county's roadsides (large and small), rights-of-way, buffer strips, and set-asides.** Not only do these seed factories reproduce offspring in fields, rangeland, and crops, shallow-rooted weeds provide little protection against erosion, and their management is costly - in chemicals, labor, and accidents resulting from working awkward sites. At **best,** current weed control methods offer expensive, self-fulfilling band aids: the ultimate results *of* scraping, spraying, disking, and mowing create fertile breeding grounds for new weed growth as the cycle continues.

Solution: **Native grasses only need mowing and spot spraying until they become established and can out-compete weeds.** Their drought-resistant roots descend **up** to 10' *for* extraordinary erosion benefits. Perennial native grasses and shrubs re-seed themselves, but do not invade crop **areas** as they take two to three years to mature. If any do appear in nearby fields, they are cultivated out as part of the routine crop cycle. Plus, natives invite beneficial insects, providing the biodiverse habitats that **sustain** them.. Predatory birds who control gophers and squirrels appear, along with game birds and other wildlife. In short, rights-of-way can be beautiful, useful and low maintenance, helping reduce overall chemical use and lowering labor, machine costs, and accidents.

Photo by John Anderson, Yolo RCD

County roadside restored using native grasses

TOPZCS

[Hedeerows| Cover Crops | Ranee Management | Canal Veeetation]
[Ponds | Roadside Veeetation | Slouch Enhancement | Prescribed Fire | Weeds]

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Revitalizing Riparian Systems

Full Article

Photo by Yolo RCD staff

Arial of denuded stream

Problem: **Straightening and channelizing irrigation waterways has turned these once healthy streams into mechanized water delivery conduits, thus removing many original farming benefits.** The results threatened or destroyed stream vitality, leaves canal banks bare of native vegetation that filter excess nutrients and chemicals and makes them vulnerable to weed growth. With awkward 90 degree bends, narrowed streams cannot handle even moderate winter storm runoff flows, producing bank erosion and, with flooding, considerable property damage. Artificial, lifeless channels provide tittle habitat for fish or wildlife, their open ground supports weed infestation, and erosion is inevitable even without high stream flows.

Solution: **Correctly-terraced and planted canal banks foster the right vegetation in the right place to provide the right benefit.** Appropriate trees (oaks, willows, cottonwoods) on the south side of a stream will shade out and reduce invasive weed growth. With roots up to 10' deep, native plants and shrubs out-compete weeds and stabilize bank sides while filtering and absorbing excess nutrients and chemicals. Widening channelized stream banks into more natural cross-sections helps sustain native plant vegetation and increases flow capacity. Planting native shrubs, forbs, and *grasses* provides important wildlife cover and nesting areas, and the protective groundcover controls erosion. In short, strategically-installed native plants, shrubs and trees revitalize otherwise dead waterways, even after channelization

Photo by Yolo RCD Staff

Creek revegetation efforts

TOPICS

[Hedgerows | Cover Crops | Ranee Management | Canal Veeetation]
[Ponds | Roadside Veeetation | Slouch Enhancement | Prescribed Fire | Weeds]

Coordinated Management Restores Rangeland

Photo by Yolo RCD staff

Range assessment activity

Problem: **Fragmented grazing techniques minimize naturally available forage, stimulate proliferation of noxious weeds, decrease groundwater recharge, and increase stream erosion, sediment deposition, and excessive storm runoff.** Conventional grazing, which tends to overuse favored pastureland, depletes forage growth and degrades overall rangeland health - which is detrimental to profitable ranching and wildlife diversity. In many ranch areas, the dominant species are either indigestible or dangerous: yellow star thistle, pepper weed, medusahead, rip gut, and their kin.

Solution: Integrated management redeems rangeland, so that both cattle and wildlife, for example, can use it from late spring through fall. Comprehensive management encourages drought- and fire-resistant native grasses for forage and weed control while fostering ground covers that reduce erosion and sediment depositions downstream.

Effective weed management requires good ***timing*** and a mix of tools such as fire, timed grazing, and selective herbicides. Co-ordinated **grazing** maximizes rangeland utility by using local ecological strengths to increase and extend the period of forage **quality.** Multi-purpose, rangeland hill ponds provide stock and wildlife watering sites, catch storm **runoff** and capture sediment so that it stays on site. Ponds encourage slow percolation of **storm** water, recharging the local water table and streambeds. In short, by understanding what **has** ***going*** wrong, ranchers can look to their pastureland **as** both available resource and long-term asset.

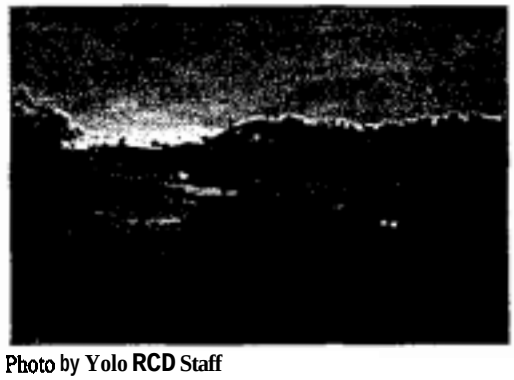

Photo by Yolo RCD Staff

Rangeland Hill pond

TOPICS

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Fire! Fire! As a Management Tool, Not a Curse

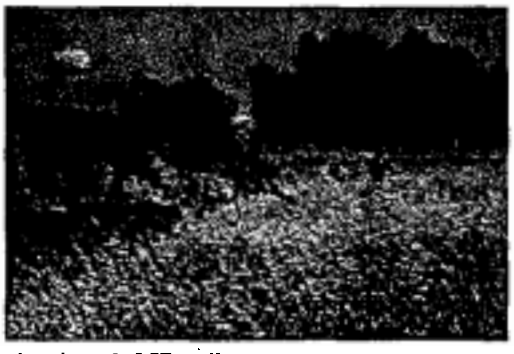

Photo by Yolo RCD staff

Controlled burn on grasslands

Problem: **Excluding fire from hills, forests, and wildlands for decades has created massive fuel loads which lead to hotter, more destructive, and expensive fires. By** excluding periodic fire from management regimes on hills, forests, and wildlands we have allowed fuel loads to accumulate, promising hotter fires and inviting conflagrations. Like anything else, too much control can get out of hand!

Solution: **Controlled burns making fire a natural part of landscape health, reducing noxious weed and plant expansion *in* and around farms and ranchland.** The RCD supports judicious burning, that focuses on controlling invasive weeds and woody plants and promoting the growth of native *grasses*, which naturally evolved and even depend on occasional fires. When co-ordinated with knowledgeable local and regional fire officials, controlled bums can be a safe, effective management practice. We are working to create an area-wide blanket permit program through the RCD, CDF, and local fire districts for controlled bums in the western *range.* If you would like to reduce the cost *of* a bum, do it safely, and with the support *of* CDF teams, contact the RCD for more information

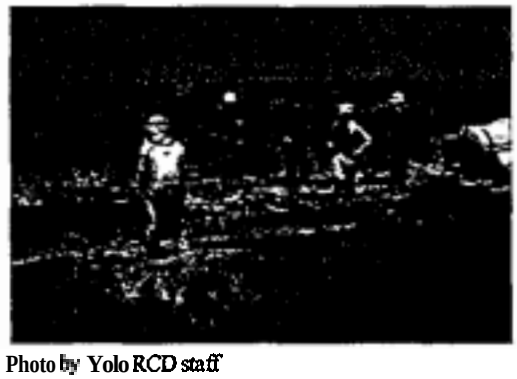

Photo by Yolo RCD staff

Working a safe, controlled burn

TOPICS

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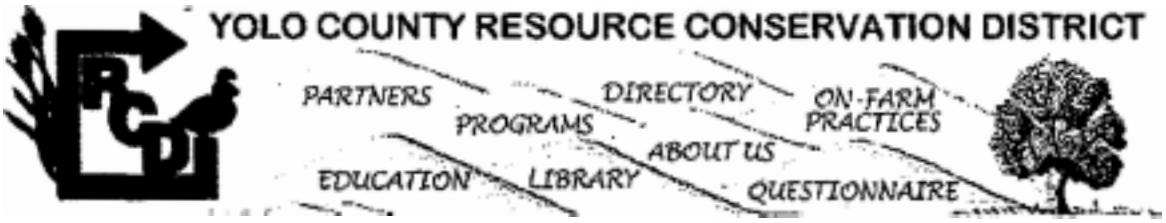


A Weed War We Can Win

PROBLEM:

In extent and staying power, noxious weeds stand alone as threats to the health of western farm and ranch lands. No farm or ranch is immune. As roadways, set-asides and canals become unintended weed seed nurseries, food production costs grow and strong chemicals spread across the land. Further, weeds deplete natural areas, out-competing native vegetation and literally consuming hillside rangeland. The downsides are obvious: less native feed, less control against erosion, and less groundwater percolation. Depleted habitat explains why marker wildlife species are dwindling: their homes are under assault, with less forage, nesting, and resting corridors. The proof is all too visible: once abundant game species (pheasants, dove, and quail) are now rare sightings.

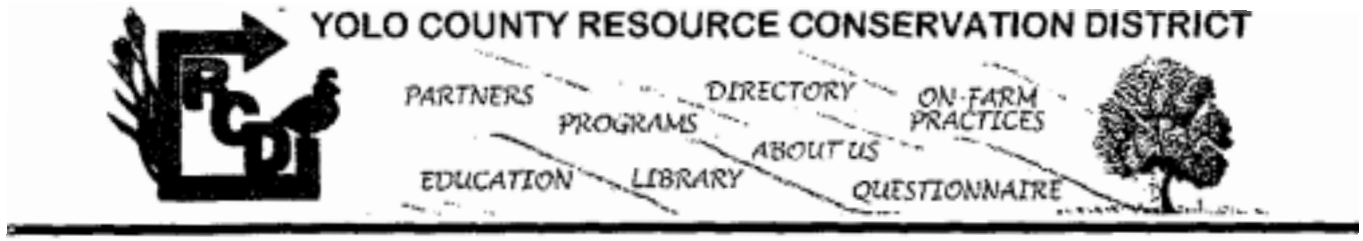
SOLUTION:

The good news: unlike even more complex problems (air and water quality; groundwater subsidence), weeds are not invincible nor beyond individual control. Weed growth is within the scope of every farmer and rancher, especially when neighbors and agencies work together. Though the counterattack takes time and persistence, everyone can turn back noxious weeds. Clearly, one-time weed removal is not the way. We must replace the unwanted plant with the desirable. Success depends on adopting a basic management program that respects the weed threat and offers equally powerful responses. Here are some first steps.

1. Identify and understand noxious weed cycles;
2. Select site-appropriate management and eradication methods;
3. Replace invaders with beneficial grasses, shrubs, and trees to impede weed growth; and
4. Commit to *ongoing* weed control and plant cultivation to assure permanent dividends.

In open areas or borders that stay relatively dry during winter, perennial native bunch grasses are ideal. Once established, they out-compete unwanted species, provide deep, drought-resistant roots, thrive on controlled burns, require low to no chemical inputs, and attract farm-friendly wildlife. Grassed buffers reduce runoff and Wer agricultural and roadside pollutants. Add a native plant hedgerow and

TOPICS



Yolo County RCD Questionnaires

Yolo County RCD is committed to protect, improve, and sustain the natural resources of Yolo County. We can improve our programs and outreach to better fulfill this mandate if we hear from you, our constituents.

ARTICLES

Online Questionnaire

Print Questionnaire

Please take the time ***to*** fill out and return our Questionnaire. It is available in two formats: as an Online Questionnaire **for** direct online submission and as a Print Questionnaire which can be printed and then mailed **or** faxed to **us.**

Thank-you for **your** help.

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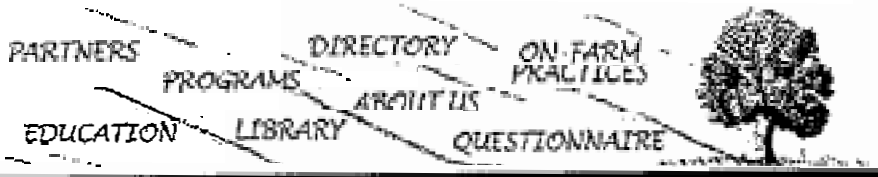

Yolo RCD Questionnaire

Instructions:
1. Print **Questionnaire**
2. Answer Questions
3. **Mail or Fax** to Yolo RCD at address at the **end** of questionnaire

1) Are you a resident of Yolo County?
___yes ___no

2) Are you a: (check **all** that apply)
___Row crop fanner
___Tree crop farmer
___Rancher
___**Rural** landowner
___**Educator:** __K-6, __Jr. High, __High, __College
___Consultant
___Wildlife specialist
___Landscaper
___Agency personnel
___**Politician/Decision-maker**
___Researcher
___Other: _____

3) Have you ever attended **an** RCD workshop?
___yes ___no

4) Have you previously worked with the Yolo RCD or the Natural Resources **Conservation Service?**
___yes ___no

5) What kind of **assistance** did you receive? (check **all** that apply)
___Conservation farm planning
___Irrigation water management
___Wetland evaluation
___Riparian vegetation design/restoration
___**Forestry**
___Ranching
___Fire ecology
___Soils information
___Weed management
___Wildlife habitat
___Ponds; (__design; __vegetation)
___**Stream** bank improvements (non-biological)
___Cover crops
___Total resource management on-farm
___Aerial maps
___Canal bank revegetation
___Native grass restoration on roadsides, ranch, other
___Tamarisk **or** giant reed control
___Hedgerow design and planting
___Had the RCD or NRCS participate on your **committees**

___Cost-share programs - which ones? _____

___Resource information for your consulting projects

6) Were you already familiar with the RCD?
___yes ___no

7) How did you get to our web site?
___By surfing for information.
___Accidentally surfed to website
what kind? _____
___Someone gave me the site address
___An NRCS or RCD employee told me about it
___I saw the site address advertised
___It was a hot link directly from another page
Which page? _____

8) Are you familiar with the USDA cost-sharing programs or others through Ducks Unlimited, US Fish and Wildlife, Wildlife Conservation Board, etc.
___yes ___no

9) Did you find the information you were looking for at our site(s)?
___yes ___no

10) What information was missing that you needed?

11) In which formats do you prefer to receive information? (check one)
___Print/Brochure
___E-mail
___Web document
___FTP original document

12) Would you like to see more resource information posted on this web site; if so, what kind?

13) If you are an educator, what kind of resource information and format would you find most useful in working with your students?

14) Are you interested in field trips for your students, teachers, clients? ___yes ___no If Yes, What kind and for how many?

15) Anything else we should know?

Optional:
Name:
Address:
City, State, Zip:
Phone #:
Email:

Thank You for participating in the Yolo RCD Questionnaire

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Idaho OnePlan

IDAHO ONEPLAN

http://www.oneplan.state.id.us

A unique collaboration of agencies, industries and associations dedicated to assisting Idaho Farmers and Ranchers in their continuing quest to improve stewardship of our natural resources

A New Approach to Farm Planning

- Developed jointly through multi-agencies & local agricultural interests
- Computer-based to improve efficiency and effectiveness
- Enables users to readily understand regulatory requirements
- Integrates agency programs and opportunities into a single plan
- User-driven Voluntary/Confidential planning process

Topic Areas

...HOW WE INTEGRATE...

Farm Planning
Croplands
Nutrient Management
Pest Management
Best Management Practices
Air Quality
Rangelands
Financial Assistance
Water Quality
Endangered Species
Storage Tanks
Waste Management
Water Management
Wetlands
Forestry

CURRENT STATUS OF THE ONEPLAN

⇒ 700+ pages of information tailored for Idaho agricultural producers
⇒ 400+ links to external agricultural related sites
⇒ Currently 41% (>10,000) of Idaho producers with Internet access
⇒ Expected growth by end of 2000 is estimated at 60% or 14,000 users
⇒ Site receives over 400 visits a week
⇒ Implementation of the Visual Basic Conservation and Nutrient Management planning Tools is currently being supported with State Funds
⇒ Recognized in Soil Conservation District Law as the primary computer-based conservation planning process for all natural resource concerns in Idaho

ONEPLAN SUPPORTERS

- Office of the Governor
- Idaho Soil Conservation Commission
- Idaho Department of Agriculture
- Idaho Association of Soil Conservation Districts
- Idaho Department of Fish and Game
- Idaho Dairymen's Association
- Idaho Department of Water Resources
- Idaho Department of Environmental Quality
- Idaho Farm Bureau
- Idaho Grain Producers
- USDA Natural Resources Conservation Service
- USDA Farm Service Agency
- USDA Forest Service
- USDA Agriculture Research Service
- USDI Bureau of Reclamation
- USDI Bureau of Land Management
- Environmental Protection Agency
- Idaho Rural Partnership
- University of Idaho Cooperative Extension
- US Fish and Wildlife Service

OnePlan Benefits

⇒ Saves staff time – farmer completes as much as possible before seeking NRCS/FSA or other agency assistance
⇒ Provides a valuable tool for farmers and ranchers, as well as conservation planners
⇒ Improves producer understanding of natural resource & environmental requirements
⇒ Eliminates multiple planning efforts
⇒ Consistent with administration philosophies and missions (i.e., joint USDA/EPA Clean Water Action Plan)
⇒ Provides focal point for planning - emphasizes planning to solve natural resource problems rather than to meet program requirements
⇒ Provides mechanism to achieve Total Maximum Daily Loads, Endangered Species protection, Safe Drinking Water, and other resource goals

05/2000

What is the Idaho OnePlan Project? ....*It's several things:*

The information Components: Efforts have involved 20 different agencies, groups, and associations working together since 1994. Many of the products of these efforts are featured on our website: www.oneplan.state.id.us. The website has integrated various agency requirements into agriculture related Topics. Teams of approximately 70 experts drawn from industry and agencies make decisions for content found within each Topic. EZGuides have been developed to assist the user in understanding the applicability of various agency requirements, including EPA water permits, 404 wetland permits and underground storage tanks.

Planning Tools: A series of planning tools under development, will assist producers and planners working with producers in developing a single farm plan (Oneplan) that will address all agency needs and requirements. The tools are a series of computer-based applications (decision support tools), which when completed will collectively yield a OnePlan. To qualify for State or Federal assistance, or other incentives, or to be assured that this plan will satisfy agency requirements the producer can seek OnePlan certification. 3rd party trained and licensed professionals will make such certification.

A *prototype* of the Conservation Planning Tool has recently been completed. The prototype demonstrates the decision support system concept that is not yet an operational tool available on the Internet. A ***pilot*** application will be developed for the Fifteenmile Creek Subwatershed of the Lower Boise Watershed, which includes part of Canyon and Ada County, Idaho. The pilot will enable farmers within the watershed to prepare a conservation plan using local data and computer software tools downloaded from the Internet. This download package includes the OnePlan Mapping, Conservation and Nutrient Management Planning tools, a photographic image of the farm, soils data, and any other information relevant to resource planning. This approach will maintain confidentiality by allowing users to develop their OnePlan on their own computer without the inconvenience of slow Internet access time. After testing and refinement the tools in the Fifteenmile Creek Subwatershed, the OnePlan will be expanded to include the entire Lower Boise Watershed and then ***statewide*** to each of the other watershed in Idaho.

Concurrently, our Topic Teams, in collaboration with our Design Team, will be developing other tools including ***Livestock Management, Pest Management, Habitat Management, Water Management, Range Management and Fuel Storage.*** As each of these tools are completed they will be integrated into the overall OnePlan process to yield a seamless and multi-faceted decision support system for producers and professional planners.

Support: State funding for the Fifteenmile Creek Subwatershed pilot will allow the completion of the Conservation and Nutrient Management Planning applications, as well as the mapping components necessary to serve-up and utilize "clipped" farm level imagery and other GIS data Funds are included to help producers implement their plans. The Idaho OnePlan is also part of the USDA ***internet Conservation Assistance*** *Tools* Business Process Re-engineering (BPR) project.

Institutional Changes: The OnePlan is now included within the Idaho Soil Conservation District Law. The responsibility for its integrity, safety, and technical data will be protected and maintained by the Soil Conservation Commission, with overall oversight and direction provided by the OnePlan Executive Committee. As the project continues to mature, our Executive Team is dedicated to the process of identifying and overcoming institutional constraints.

Idaho OnePlan Planning Tools

Two valuable elements of the Idaho OnePlan project are the automated planning tools and electronic access of information. Conservation and Nutrient Management Planning Tools are currently under development. Both of these tools utilize a GIS interface as the front end. Producers will locate their farming operation(s) over the Internet and will download "clipped" fann-level imagery and other data, as well as the planning tools. The GIS interface will then fill in associated input fields residing in the Conservation and/or Nutrient Management Planning Tool with relevant geographic data for the areas specified. These tools will be run on the Producer's own computer and will allow a smooth transition to the Internet interface.

The farm imagery, linked to associated GIS data layers such as soils information, is the main computer screen where the use is guided to delineate fields, map buildings, corrals, and resource concerns, describe crop rotation and irrigation practices, enter soil testing data, and schedule manure, fertilizer and other agri-chemical applications. The output of the Conservation Planning tool is an "approvable" conservation plan. The output of the Nutrient Management Planning tool is the nutrient management component prescribed by the conservation plan that agronomically balances nutrients (N, P and K) in the cropping system and recommends proper application rates of animal waste and/or commercial fertilizers to minimize ground and surface water impacts and maintain long-term sustainability.

Conservation Planning Tool: The project draws on the strong foundation that NRCS has in natural resources planning to construct a "grassroots" planning approach. This approach embodies the traditional and proven NRCS planning process while providing for Internet-based delivery and support. The Conservation Planning Tool has been directly aligned with the NRCS planning process as captured in the Field Office Technical Guide. This alignment is critical to the success of the OnePlan in Idaho and national deployment.

Resource planners working with producers can use the Conservation Planning Tool to develop a Plan that will provide for the conservation, wise use, and protection of the resource base for soil, water, air, plant, and animal (SWAPA) resources. Two primary steps *are* used to simplify the development of a conservation plan.

The first step involves geographically locating a planning unit (farm, ranch, etc.) and identifying the Common Resource Area setting in which the planning unit lies. This setting characterizes typical resource conditions, typical resource problems and conservation solutions to those problems. This step in the process establishes the foundation from which to begin the construction of a conservation plan. The level of detail of Common Resource Areas are dependent on critical issues identified within a specific area of interest (Total Maximum Daily Load listed, Endangered Species, Safe Drinking Water, etc.).

The second step allows the plan to be customized based on the uniqueness of the planning unit. This is accomplished using Resource Assessments that allow the evaluation of SWAPA resource concerns. If conservation solutions have already been implemented to correct a resource problem(s) typical of the Common Resource Area setting, a resource assessment of the corresponding resource problem would eliminate it as a problem in the Conservation Plan. Likewise, if a resource problem was not typical to the Common Resource Area setting, a resource assessment of the corresponding resource problem would identify it as a problem in the Conservation Plan, and conservation solutions could be selected and planned for implementation.

Nutrient Management Planning **Tool:** As part of a Cooperative State Research, Education, and Extension Service (CSREES) grant the Nutrient Management Planning Tool is being cooperatively developed by a multi-agency team. The outcome of this project will be to: 1) complete an automated Idaho-approved nutrient management planning tool designed to optimize crop production goals, while protecting Idaho's surface and ground water quality; **2)** simplify nutrient management compliance of animal feeding operations; and **3)** stimulate awareness and action by other agricultural producers toward nutrient management planning.

Once complete, the Conservation and Nutrient Management Planning Tools will better enable agricultural producers and professional planners to:

- Geographically locate farming operations, and plan using associated imagery and other GIS data ;
- Identify and designate farm fields, structures and appropriate resource concerns;
- Maintain farm records including crop rotation, soil testing data and nutrient applications;
- Evaluate the adequacy of existing animal waste facilities and determine necessary improvements;
- Identify vulnerable resource areas that require special consideration;

- Schedule agronomic-based nutrient application rates that optimize economic returns, while protecting Idaho's environment.
- Print Idaho–approved components of a certified Nutrient Management Plan (certification will still need to be completed by a certified planner).
- Develop farm plans that can be used to contract with producers to implement necessary BMPs.

USGS Quad Map of Union School Slough sub-Watershed of Willow Slough


The Union School Slough
Sub-watershed of the Will
Watershed
Yolo County, California
ERPP Ecozone 10.4—Yolo Basin; W
1:250,000 scale USGS quad
corner points and centroid coordin
YOLO COUNTY
WILLOW SLOUGH WATERSHED
UNION SCHOOL SLOUGH WATERSHED
Slough Watershed
8 05' 00" W 388 39' 00" N
8 06' 00" W 388 36' 00" N
8 49' 30" W 388 37' 00" N
8 49' 30" W 388 35' 30" N

Clopyralid (TranslineR, DowAgriScience) Demonstration Trial

CLOPYRALID (DowElanco®) DEMONSTRATION TRIAL
YOLO COUNTY, CALIFORNIA

Jeanette Wrysinski and Paul Robins, Yolo County Resource Conservation District
Joe DiTomaso, Ph.D., Cooperative Extension Weed Specialist, Dept. of Vegetable Crops, UC Davis
***Gary* Veserat, Area Livestock Farm Advisor, UC Cooperative Extension**
Tim Baldwin, Vegetation Management Specialist, DowElanco

INTRODUCTION:

Yellow starthistle (Centaurea solstitialis) is an annual weed introduced into California more than 100 years ago (Thomsen, 1996). Its aggressive growth and high reproductive rate have resulted in its spread throughout the state in both wildlands and annual and permanent agricultural areas, where it effectively crowds out less competitive species, including forage crops, introduced rangeland grasses, and native grasses and forbs.

Yellow starthistle (starthistle) is recognized as a significant problem on annual rangeland in California. New and more effective methods for management and reduction of starthistle populations are being actively sought by private landowners, members of the cattle industry, professional organizations, private companies, and UC researchers. To that end, the herbicide clopyralid (Transline® DowElanco) is being tested in California for efficacy for starthistle control. Clopyralid is a selective, broadleaf herbicide that acts as a plant growth regulator. Post-application rains move it into upper soil layers where soil residual may provide extended control. Its effects may go into a second season, depending on the rate of application. Previous research indicates that applications made to exposed foliage may take up to 2 months to show full effects (pers. comm. J. DiTomaso).

Clopyralid is currently registered in 48 of the 50 states to control a variety of weeds in the sunflower, pea, buckwheat and nightshade families. Preliminary investigations and small replicated trials by UC researchers indicate good activity of clopyralid on starthistle with acceptable safety on other rangeland plants (pers. comm., J. DiTomaso).

Subsequent to small plot research, field scale trials can provide valuable input into herbicide performance under natural soil, climate, water and animal use conditions. *An* objective was to test clopyralid in typical, extensive rangeland conditions to provide public education, to observe field-scale performance, and to compare two different application methods

METHODS:

Three unreplicated, field-scale demonstration trials were implemented on one ranch in the foothills of western Yolo county.

Trial #1 was applied by air using a Soloy Turbine Conversion Hiller helecopter at 10 gallons per acre with a 40-ft. boom. Two nozzle types were used: T-jet 45° spinners and T-jet 4 hole 45° spinners. Applications of two rates of Transline – *2.6* and 5.2 oz per acre (1 and 2 oz ai/A clopyralid) were made to 10 acre plots with an untreated buffer zone between rates and an untreated control immediately adjacent (see map "Transline Trial #1").

Trial #2 was applied by ground using a Honda 350 4-wheel ATV equipped with a Hardy rear-mounted, 50-gallon sprayer, a 30-ft boom and Tee Jet 8002 flat fan nozzles. Herbicide applications were made on three different plots at 25 psi using 5 gallons of water per acre (gpa). Transline was applied at the same two rates as

in Trial #I- 2.6 and 5.2 oz. per acre, and 2,4-D (4.0 lb/gal) was applied at I pint per acre. **An** adjacent untreated control was included for comparison (see map "Transline Trial #2).

Trial #3 was also applied by ground as in Trial #2, but rates of 1.3 and 2.6 oz per acre of formulated clopyralid were applied. The untreated area from Trial #1 was considered sufficiently close to serve as the control for this trial (see map "Transline Trial #3")

Applications for all three trials were made on March 14, 1997. On March 5, pre-treatment weed counts and estimates of percent cover of primary plant species were completed in all blocks except those of trial **#3.** For this and all subsequent evaluations, one-foot-square quadrats were randomly chosen throughout the central area of each block for a total of 10 locations per block. Percent cover within the quadrat was visually estimated for grasses, yellow starthistle, clover, filaree and other broadleaf weeds. Percent of bare ground was also noted. Total counts were taken of clover, filaree and other broadleaf weeds, whereas starthistle was counted in a specific %-section of each quadrat and the number multiplied by 4. Grasses were considered too numerous to count. Post-treatment counts using similar methods were made on 4/11, 5/9 and 6/23 to track progressive effects on the target plants.

RESULTS/DISCUSSION:

Topography and animal use of each trial was slightly different. The area for Trial #1 consisted of low hills moving to steeper hills. The entire field was 90 acres, with 30 acres devoted to Trial #1 and approximately 10 acres to Trial #3 (low rate of Transline). Trials #1 and #3 were adjacent, such that the untreated "Control" area was common to both. This field was lightly grazed starting 1 week post-treatment with approximately 25 head of cattle for 2 weeks. Trial #2, which was **33** acres, was primarily flat with edges moving to low hills. Iiwas also lightly grazed starting approximately 1 week post-treatment with 8 – 9 heifers for 1 month. Trial #3 bordered a riparian area. The low rate of Transline was applied in the same field as Trial #1. The higher rate in this trial was applied on the opposite side of the fence in an adjacent field that was 300 acres in size. The largest percentage of this field **was** steep hill country. Fifty cattle that were present there for 6 weeks preferentially grazed the lower portion of the field. Field conditions were considered fairly normal early in the season. Two days post-application (3/16/97), between ½ and ¾ inches of rain fell. However, no further rainfall occurred beyond that date. Subsequent rangeland conditions were very *dry* much earlier in the season than usual.

At the pre-treatment evaluation date on March 5, Yellow starthistle plants were in the seedling stage, had an average of 4-5 leaves and were approximately 2 inches in diameter and **3** inches tall. Clovers had an average of 2-4 mature leaves emerged and grasses were 4-6 inches tall.

By 4/11, seedheads were exserted in the wild oats, medusahead and soft chess. **A** size difference was noted between starthistle in the treated and untreated areas in the aerial trial (trial #1). In blocks treated with clopyralid, starthistle plants were essentially the same size as on 3/5 (3-inch diameter and 3 inches tall) and were still green. Starthistle rosettes in the untreated areas varied between 6 and 10 inches in diameter and were approximately 6 inches tall. In trial #2, height and diameter differences were not as dramatic, but growth stage differences were apparent (greater number of mature leaves in untreated areas). The already very dry rangeland conditions may have contributed to or amplified herbicidal affects. This same trial, perhaps coincidentally, showed patchy, high concentrations of goatgrass and medusahead.

On May 9, untreated yellow starthistle in the aerial trial (Trial #1, Control) was between full rosette and bolting stage and 8 to 10 inches both in width and height. Where herbicide treatments were made, most starthistle

plants had not progressed beyond the growth stage noted on 4/11 and were mostly or completely desiccated. In the trials where applications were made by ground, the dry conditions caused most plants to be reduced in vigor and many appeared to go through early senescence. However, starthistle was essentially absent in the blocks treated with clopyralid, was strongly present in the untreated area, and where 2,4-D was used, some starthistle plants were stunted, dead or dying and some appeared to be unaffected. The latter were likely seedlings that germinated after treatment.

For each evaluation date, simple averages were calculated for each plant category using the data from all 10 quadrats. A standard deviation was calculated for the same data sets. Because these were unreplicated trials, further statistical analyses could not be performed. The calculations for standard deviation indicated a high degree of overall variability; however, the values for estimated percent cover showed less variability than plant counts and may be more indicative of the actual field situation. A larger sample size (more than 10 quadrats) would likely have decreased the overall variability in the data, but time limits were a strong dictator of sample size. Variability in the data decreased as the season progressed and as yellow star thistle began to show full effects of the herbicide treatment.

Trial #1 was applied aerially and showed pre- and immediately post-treatment counts of Yellow starthistle whose averages ranged from 9 to 34.5 seedlings/ft^2, covering between 4.5 and 15.5% of the surface area (Fig. 1a. and 1b). Some individual quadrats were almost completely dominated by grass, with no starthistle present. Rangeland grasses were abundant and fairly consistent throughout all plots, with occasional presence of clover and filaree. On the 3 subsequent evaluation dates, percent cover of Yellow star thistle showed a consistent decline for both rates of clopyralid, with none present on the final evaluation date. The untreated control, though starting with low levels, showed an increase in percent cover of Yellow star thistle to a final average value of 22.5% cover. 'Visual observations in specific Control plots, however, ranged as high as 50% cover. Counts showed a similar pattern of decline in the treated blocks and elevated levels of yellow starthistle in the untreated area.

Although filaree and clovers showed a steady, gradual decline, levels were very low to begin with. This, combined with drought conditions may have masked or confounded the herbicide effects. Although some of the clovers did show slight herbicide symptoms at the 2nd and 3rd evaluation dates, it is difficult to say whether their ultimate decline was due more to the herbicide rate used, the extremely dry rangeland conditions throughout the season, or a combination of both.

In trial #2, applied by ground, initial Yellow starthistle levels were fairly consistent and high throughout the entire field. The average initial cover ranged from 29.3 to 35.9% over all four plot areas (Fig. 2a). Rangeland grasses were similarly consistent and high. Yellow starthistle seedling counts ranged from 79.2 to 105.6 seedlings/ft^2 (Fig. 2b). Variability of data was again high between individual quadrats, but less so in the estimates'of percent cover as compared to counts.

Herbicide'effects did not begin to show until the second post-treatment evaluation date on May 9, at which time, both clopyralid rate treatments showed effective control of yellow starthistle, with complete control at the high rate and 7.5% cover at the low rate. Although less dramatic the 2,4-D treatment also showed a measure of control at the same date. Weed levels in the 2,4-D plot showed final percent cover values comparable to the clopyralid plots; however, late-season seedlings were emerging in the 2,4-D plot alone. By July, yellow starthistle cover in the 2,4-D treated plots had increased dramatically compared to the low rate of clopyralid (no data taken). Starthistle counts also declined slightly in the 2,4-D and control treatments (Fig. 2b). Based on observations, the decline appeared, in part, to be due to extremely dry rangeland conditions.

Trial #3 used a very low rate of clopyralid (1.3 oz formulated product per acre) along with a standard rate (2.6 oz formulated product per acre), which together could be instructive in understanding rate-related soil residual affects. Inclusion of this trial was determined at a late date so no pre-treatment data were available for the treated areas. However, this trial was conducted in the same field and was adjacent to Trial #1. Pre-treatment data from the untreated control for Trial #1 was thus used for comparison

Considering mean percent cover and using the untreated control from Trial #1 as a baseline, Yellow starthistle started out at low levels, increased until the second evaluation date and remained high in the untreated area. Starthistle levels dropped to zero in the clopyralid treated areas where the 2.6-oz per acre rate was used (Fig. 3a). Mean counts showed a similar pattern in the control as well as the treated areas, again with the higher rate causing eventual elimination and the lower rate sustaining low numbers of starthistle by the time of the last evaluation on 6/23 (Fig. 3b).

Visual assessment of all of the trials showed dramatic differences by the time of the final assessments on 6/23. Areas treated with clopyralid appeared totally free of starthistle; whereas untreated areas showed dense, green cover of starthistle plants. As the season progressed, starthistle clearly dominated the landscape in untreated areas. Sharp dividing lines were apparent where treatments stopped or began. Areas treated with 2,4-D appeared to be starthistle-free from a distance, but close examination revealed younger plants - otherwise concealed by range grasses – which produced flowers and seed by late summer.

There is interest and concern over the effect of clopyralid on desirable rangeland forbs. Clovers and filaree were present in these trials only at very low levels, with only the occasional quadrat having 1 to 3 plants. However, observations were made that provide information that the quadrat counts do not illustrate. Filaree was present in numbers too low to comment on. Clovers observed in the treated areas (primarily rose-clover) did show leaf bum and some stunting by 4/11. By the final evaluation date, most of the dried plant remnants that were present had mature seed heads and appeared to have completed their life cycle in spite of some limited damage early on.

The trends shown in these demonstration trials do not seem to differ by method of application. Control of Yellow starthistle was accomplished in both the aerial and ground trials. Reasons for using different application methods will likely depend upon both cost and soil conditions at the time that application is needed. The landowner/cooperator for this trial calculated costs for both application methods, based on an estimated cost for ciopyralid. Aerial applications of the 1-oz rate of clopyralid were approximately $1.35/acre higher than ground applications. The ground application was in turn approximately $4.70/acre higher than a 1-pint/A application of 2,4-D. In evaluating cost vs. benefit, consideration should be given to efficacy and residual control as well as costs. With landowner permission, these same treated areas will be re-evaluated during the following growing season in the absence of additional herbicide treatment to observe levels of residual control by each of the herbicides as compared to untreated areas.

In spite of the fact that treatments were not replicated, results from this field-scale demonstration trial indicate excellent potential for control of Yellow Starthistle using clopyralid (Transline). Dependence strictly upon chemical control measures can, however, lead to such problems as herbicide resistance. An integrated approach that also includes burning and/or land management techniques is likely to provide the most satisfactory and effective long-term control.

This field-scale application of clopyralid proved to be a very valuable demonstration and education opportunity for researchers as well as rangeland managers. The opportunity to make successive field visits and observations provided insight into starthistle control under normal animal-use conditions and, through a late-season field-

day, allowed a broad variety of professionals and practitioners to observe results and learn about new methods for starthistle control.

Thomsen, C.D., et. al. 1996. Yellow Starthistle Biology and control. UC/DANR Publication No. 21541. 19 pp.

Special *thanks* are given to Henry, Casey and Scott Stone for the use of their ranch for the trial and for their strong support, and also to Tim Baldwin of DowElanco for providing the herbicide, for technical support and for support for the field day.

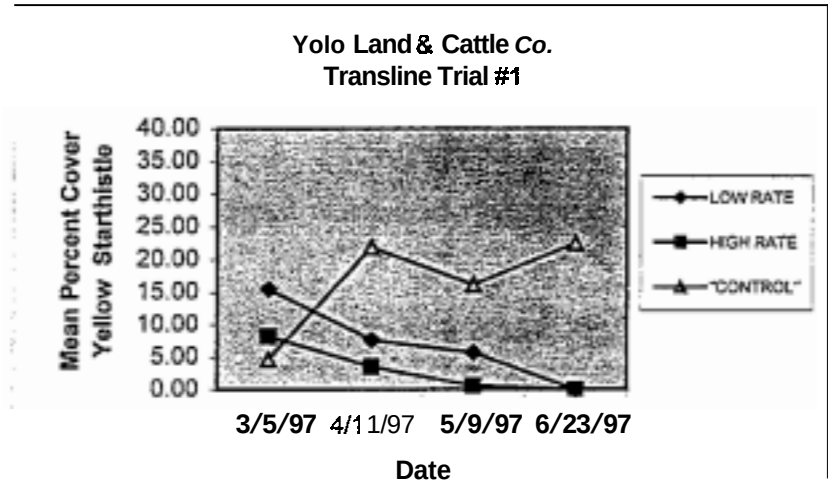

Yolo Land & Cattle Co.
Transline Trial #1
Mean Percent Cover
Yellow Starthistle
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
LOW RATE
HIGH RATE
"CONTROL"
3/5/97
4/11/97
5/9/97
6/23/97
Date

Fig. I a

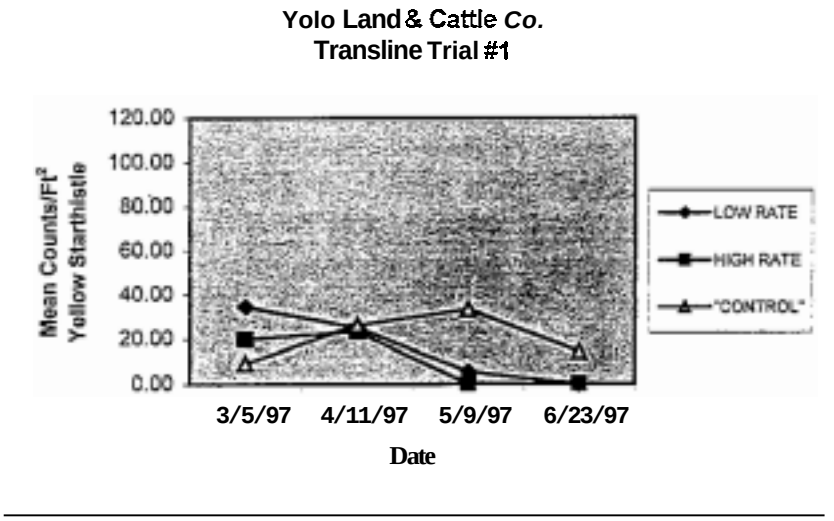
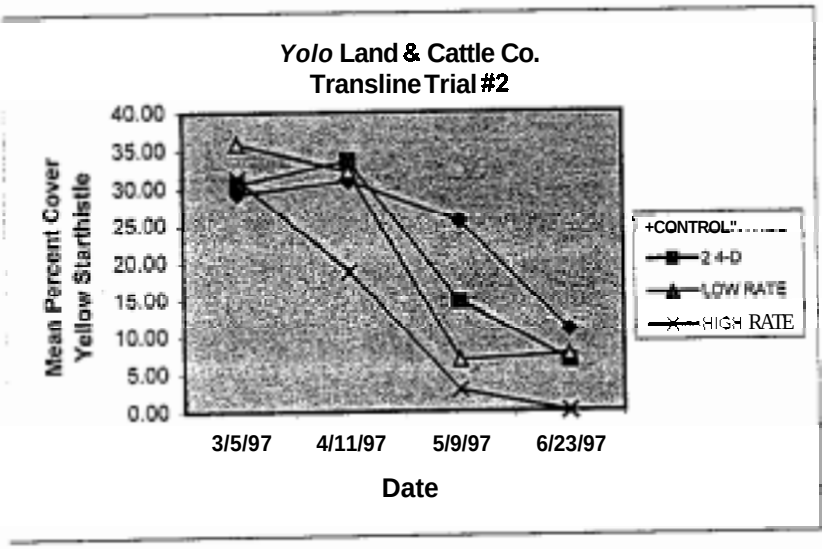

Yolo Land & Cattle Co.
Transline Trial #1
Mean Counts/Ft²
Yellow Starthistle
120.00
100.00
80.00
60.00
40.00
20.00
0.00
LOW RATE
HIGH RATE
"CONTROL"
3/5/97
4/11/97
5/9/97
6/23/97
Date

Fig Ib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Transline Trial #2
Mean Percent Cover
Yellow Starthistle
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
3/5/97
4/11/97
5/9/97
6/23/97
Date
+CONTROL"
2 4-D
LOW RATE
HIGH RATE

Fig. 2a

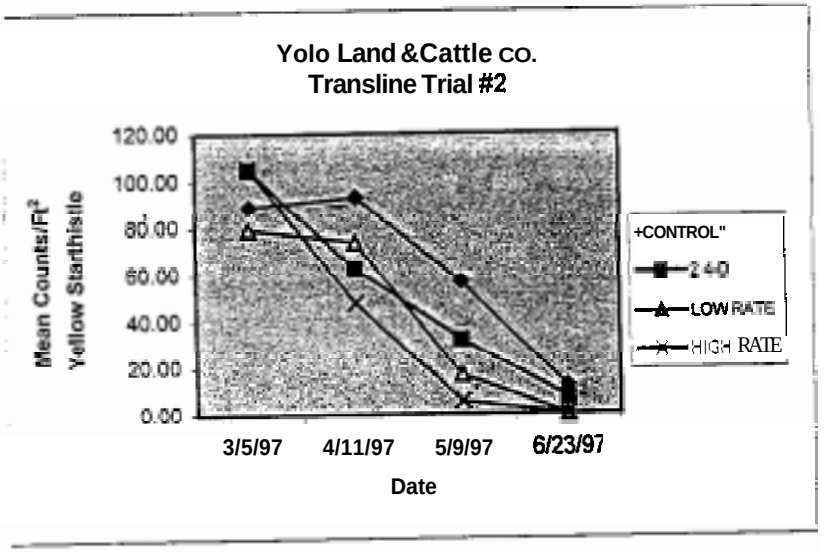

Yolo Land &Cattle CO.
Transline Trial #2
Mean Counts/Ft²
Yellow Starthistle
120.00
100.00
80.00
60.00
40.00
20.00
0.00
3/5/97
4/11/97
5/9/97
6/23/97
Date
+CONTROL"
2 4-D
LOW RATE
HIGH RATE

Fig. 2b

Yolo Land & Cattle Co.
Transline Trial #3

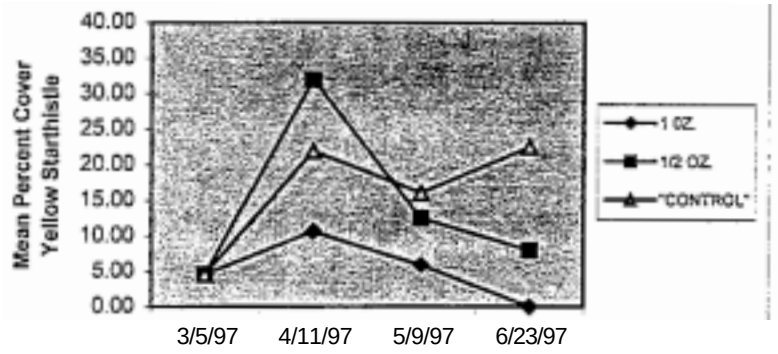


Fig 3a

Yolo Land *&* Cattle Co.
Transline Trial #3

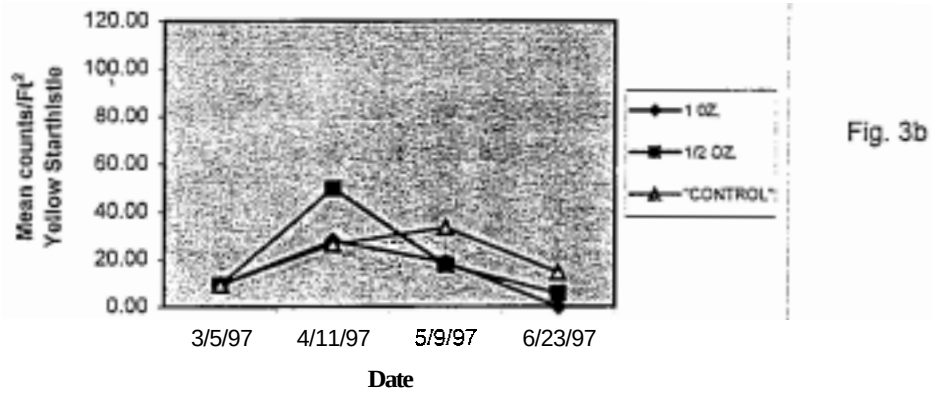


Fig. 3b

Native Grass Forage Quality Pilot Study

Native Grass Forage Quality Pilot Study

Jeanette Wrysinski and Paul Robins, Yolo County Resource Conservation District
Gary *Veserat, U. C. Cooperative Extension*

The millions of acres of mountainous and hilly rangeland in California provide an ideal landscape for the restoration of native bunchgrasses. Rangeland managers are legitimately concerned. however, about replacing existing forage grasses with native grasses of uncertain nutritional value.

To begin to address this concern, the Yolo County Resource Conservation District initiated a pilot study of native grass forage quality in 1996. We analyzed the nutritional content of eight species of California natives and compared them with published information on three typical forage grasses. While the pilot study results are inconclusive due to lack of replication and the absence of comparable measures of forage grasses within the study, our preliminary findings are encouraging and clearly indicate the need for further research.

METHODOLOGY

We sampled eight species of native grasses, grown under similar conditions at the seed production fields of Hedgerow Farms in Yolo County. The species included *Nassella pulchra* (Purple needlegrass), ***Nassella cernua*** (Nodding needlegrass), ***Elymus trachycaulus*** (Slender wheatgrass), *Melica californica* (California oniongrass), ***Leymus triticoides*** (Creeping wildrye), *Elymus glaucus* (Blue wildrye), Poa ***secunda*** (Pine bluegrass), and ***Hordeum brachyantherum*** (Meadow barley). Hedgerow Farms cultivates the grasses on slightly raised double beds. The grasses were fertilized on February *20*, 1997 with ammonium sulfate at 100 lbs./acre and were irrigated once in March.

We sampled each grass four times, with sampling times determined by both calendar and phenology. All grasses were sampled on January 30,1997 when they were in vigorous early stages of vegetative growth. **At** this time, the smaller stature species (such as Poa and ***Hordeum)*** were approximately 4 - 5 inches tall, while the taller species (such as *Elymus)* were up to 12 inches. The second samples were taken at 50-75 percent heading (50-75 percent of seed heads fully exserted), an expected peak in nutritional quality. Dates for this phenological stage varied from grass to grass and are noted in Table 1. A third sample was taken prior to seed shatter — immediately preharvest. This too varied by species and is summarized in Table 1. A final sample of remaining straw was taken for all grasses on August 11,1997.

On each sampling date, we collected a minimum 300-gram sample of each species from approximately 15 random locations within each grass block. We clipped specimens *to* within approximately 3-4 inches of the soil level and included all clipped plant parts in the sample. There were no replications. We shipped the samples immediately to an agricultural laboratory where each was analyzed, in both fresh and dried forms, for percent moisture, crude protein and acid detergent fiber (ADF) (See Table **1,** page 4). The analysis also measured total digestible nutrients (TDN), percent nitrogen, net energy for lactation (NEL), and estimated net energy (ENE), but these values are not included due to lack of space.

DISCUSSION

Ideally, this study would have included comparable analysis of annual rangeland grasses and forbs grown under the same conditions as the native study species. Unfortunately, no typical rangeland forage species were available at our pilot study site. We therefore selected three forage species for which reasonably comparable published nutritional values are available, for approximate comparisons with our study species. These include alfalfa ***(Medicago*** sativa), ryegrass ***(Lolium spp.),*** and filaree ***(Erodium cicutarium).*** Values for crude protein and crude fiber are from the Atlas of Nutritional Data on United States and Canadian Feeds* (Table 1, the shaded area). The published Crude Fiber (CF) values for the forage species are not necessarily equivalent to the Acid Detergent ***Fiber*** (ADF) measured for the native species **(ADF** is newer and more specific to cellulose and lignin than the more general CF measurement). They should therefore be used for reference only.

The grass seed production fields at Hedgerow Farms provided fodder to analyze ***nutritional quality of native grasses***

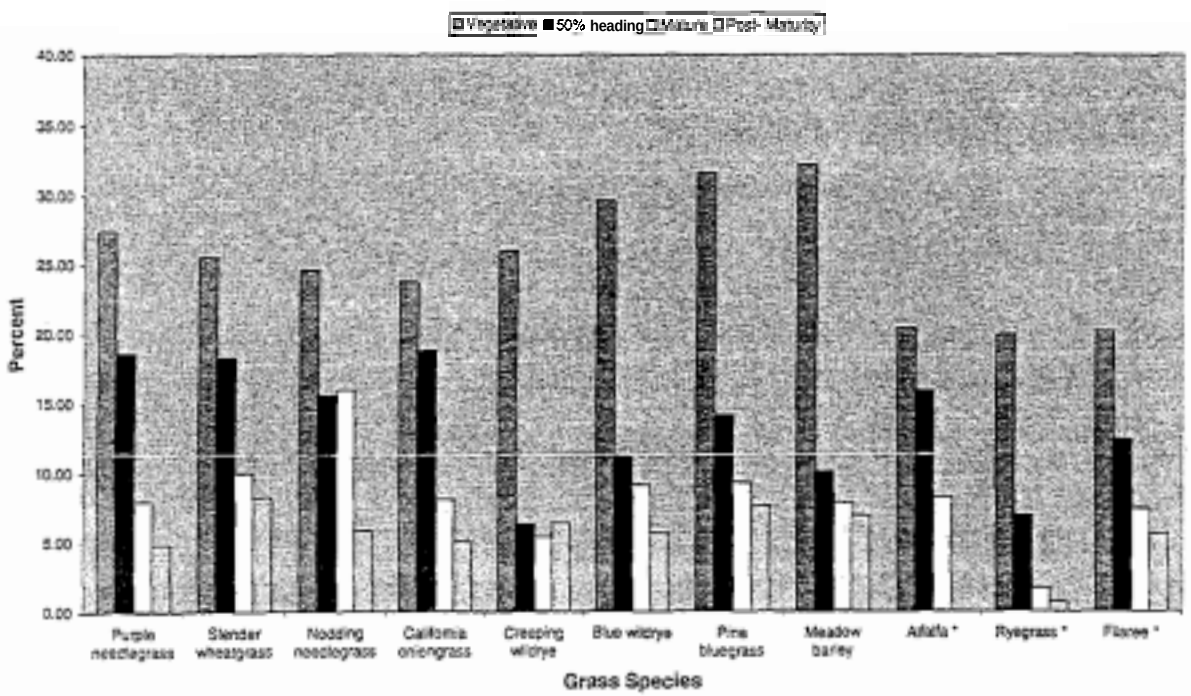
Continued on page 4

Forage study, continued from page 3

Table 1. Native Grass Forage Quality Pilot Study (Data are for dried samples)		Crude protein				Acid Det. Fiber (ADF)				Sampling date (1997)			
		Growth stage*				Growth stage				Growth stage			
Species	Common name	V	S0%	M	PH	V	S0%	M	PH	V	50%	M	PH
Nassella pulchra	Purple needlegrass	27.38	18.56	7.94	4.82	30.28	31.17	46.69	61.45	1/50	3/17	4/28	8/11
Elymus trachycaulus	Slender wheatgrass	25.50	18.25	9.98	8.20	29.71	33.93	38.69	67.66	1/51	4/14	5/21	8/11
Nassella cernua	Nodding needlegrass	24.56	15.56	15.88	5.84	29.24	35.99	43.46	58.64	2/1	3/19	4/28**	8/11
Melica californica	California oniongrass	23.75	18.75	8.06	5.05	28.06	29.56	36.95	49.06	2/2	3/17	5/2	8/11
Leymus triticoides	Creeping wildrye	25.94	6.31	5.38	6.42	26.99	44.48	42.23	44.78	2/3	5/13	6/2	8/11
Elymus glaucus	Blue wildrye	29.56	11.19	9.13	5.68	21.02	45.45	33.90	64.52	2/4	4/28	5/29	8/16
Poa secunda	Pine bluegrass	31.56	14.13	9.31	7.61	26.16	24.21	43.22	48.14	2/5	3/3	4/28	8/11
Hordeum brachyantherum	Meadow barley	32.19	10.13	7.81	6.89	23.45	34.73	29.15	55.64	2/6	3/31	5/6	8/11
Medicago sativa	Alfalfa	20.40 immature	15.90 mid-bloom	8.20 milk stage		44.00 CF	44.00 CF	40.40 CF		imm-ature	mid-bloom	milk stage	
Lolium spp.	Ryegrass	19.90 imm-ature	6.90 mid-bloom	1.70 mature	0.70 straw	18.90 CF	23.60 CF	36.30 CF	56.90 CF	imm-ature	mid-bloom	mature	straw
Erodium circutarium	Filaree	20.20 imm-ature	12.40 full bloom	7.40 milk stage	5.60 mature	12.20 CF	17.80 CF	19.90 CF	25.80 CF	imm-ature	mid-bloom	milk stage	mature

*V=vegetative (4-6" plant height); 50%=approx. 50% heading; M=full maturity, immediately pre-harvest; PH=2-3 months post-harvest
**substituted another sample of *Nassella cernua* for final sample
Data in the shaded area are taken from Atlas of Nutritional Data on United States and Canadian Feeds. 1971. Subcommittee on Feed Composition, Committee on Animal Nutrition, Agricultural Board, National Research Council, United States and Committee on Feed Composition, Research Branch, Department of Agriculture, Canada.

Crude protein for 8 native, perennial bunchgrasses and text values for 3 annual rangeland forages (*) at differenl sampling times



continued on page 5

Forage study, *continued from page 4*

Figure 1 indicates that crude protein in the eight native species may be higher in the early vegetative stage than for the standard forage species. For example, at the 4 - 6 inch plant height, the value is 24.56 for *Nasella cernua* and 19.9 for *Lolium* sp. At later growth stages, the values may be comparable, on average. At 50 percent heading, for example, values for the native grasses range from 6.31 to 18.75 with text values for the three standard forage species ranging from 6.9 to 15.9 (see Table 1).

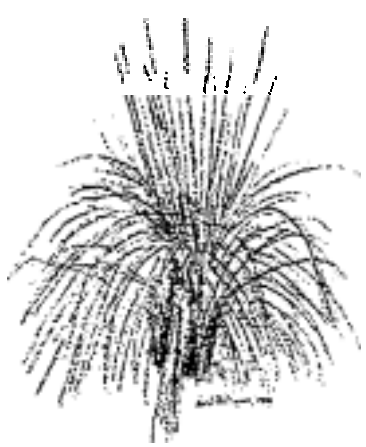
ADF values for the native grasses started out in the range of approximately 21 to 30 with measurements increasing to a range of 29 to 46 at harvest. The CF text value for immature alfalfa is 44.0 and for rye grass is 18.8. Although no fiber values were available for mature alfalfa, mature rye grass was listed with a CF content of 36.3. Recognizing that the CF and ADF figures are not directly comparable, it is still clear that the native grasses have fiber content within a range that makes them acceptable **as** forage.

Although our findings are inconclusive, they indicate that native perennial grasses may be nutritionally comparable or even superior in some respects to traditional forage grasses. In addition, some of these bunchgrasses begin to green up in late summer even without rainfall, providing green forage on rangeland at a time of year when it is otherwise unavailable. Finally, our results show considerable variability among the native species themselves, suggesting that further research into optimal native forage grass species would be fruitful.

* Atlas of Nutritional Data on United Slates and Canadian Feeds. 1971. Subcommittee on Feed Composition, Committee on Animal Nutrition, Agricultural **Board,** National Research Council, United States and Committee on Feed Composition, Research Branch, Depanment of Agriculture, Canada. 772 pp.

Special thanks to Dr. James Oltjen, Dept. of Animal Science, U. C. Davis, for consultation and review of methods and data; and to John Anderson for use of his native **grass** seed fields and for financial support of the project.

For a copy of the original study (including information on other measures of nutritional quality, contact the Yolo Resource Conservation District at 530-662-2037.



Buffers, continued from page 1

From the standpoint of native plant restoration in California, two questions are paramount: Do native species do a better job than non-natives at filtering sediments, nutrients and pesticides?; and, What is the optimum species mix to maximize buffering capacity?

IT'S ALL IN THE ROOTS

The answer to these types of questions, says plant physiologist Steve Griffith, is likely to be found in the roots. Griffith. with USDA's Agriculture Research Service in Corvallis, Oregon, is one of several researchers currently testing riparian buffers in the poorly-drained **soils** of Oregon's Willamette Valley. Roots are critical to the two most important processes for getting nitrate out of the soil—plant uptake and denitrification (the process through which soil-dwelling bacteria convert nitrate to atmospheric nitrogen). Griffith points out that when it comes to these processes, the deeper the roots, the better. Extensive root systems are able to access nitrate from a larger portion of the soil profile. Furthermore, denitrification requires both a low oxygen (reduced) environment and a source of organic carbon. "In a reduced environment like a riparian zone, you want to get as much carbon as deep as you can—and that means deep roots," explains Griffith.

Felicia Rein thinks this is precisely why native grasses ultimately may do better than non-natives at filtering some types of NPS pollution. Now in the third year of a three year study, Rein is comparing the buffering effectiveness of plots planted with native perennial grasses (*Bromus* ***carinatus,*** *Nasella* ***pulchra,*** *and* ***Deschampsia*** sp.) with those planted with an annual grass commonly used for erosion control ***(Hordeum vulgaris)*** and with unseeded, weedy control plots. The plots are located on a 12 percent slope between intensely fanned fields and Elkhorn Slough, near the Elkhorn Slough estuary. Rein and a collaborator are measuring nitrogen and phosphorus in the surface run-off (during storms), in the soil, and in groundwater as well **as** quantifying nitrogen and carbon pools in the vegetation. "We're trying to look at the whole ecosystem in order to figure out where these agricultural chemicals go," she explains.

During the first two years of the study, Rein found a slope effect (e.g. nitrate concentrations are higher at the top of the slope than at the bottom), but not a treatment effect among the different types of grasses. She thinks that may be because the root systems of the native species were not fully developed. "This year, now that the natives have had a chance to really get established, **I'm** hoping to see a treatment effect." With roots in her native plots at depths two times that of the annual plots (120 vs. 60 cm, on average), Rein's expectation may well be realized.

Continued on page 8

Landowner Web Survey, Executive Summary

The Yolo OnePlan:
What the Farmers Say.

Report and Recommendations

Prepared by: Tanya Meyer

"Production ag **is** a totally consuming occupation"
(Yolo **County** farmer, 4/1/99)

Executive Summary:

The Internet is the fastest growing communication and information system in the world, capable of conveying tremendous amounts of information at low cost over a short time period. American farmers are under more pressure from environmentalists and legislators to reduce runoff from chemical use and practice more conservation. Fanners must be able to have quick and easy access to information about conservation practice design and installation techniques. The Yolo County Resource Conservation District (RCD), in concert with the USDA, is creating an Internet-based conservation planning tool (called the "OnePlan"). **A** study of Yolo County farmers was conducted to learn what they need from such a site and how they would best use it. Most larger scale farmers (over 1000 acres) use computers and the Internet, as do part time farmers, but those who have mid-size operations often do not, although their family members might. We also found that most fanners think having a Yolo OnePlan is a good idea, and many said they would look at the site. Farmers want a practical, easy-to-use site that is well organized and has minimal graphics. They want to see examples of how conservation planning can improve their operation, how to best install projects, and they want assistance with regulations that pertain to conservation efforts. Using information gathered, the Yolo County RCD plans to create the Yolo OnePlan, which will be the prototype for a statewide project, the California OnePlan. While the RCD is not a regulatory agency, it is interested in assisting farmers with conservation activities to avoid and perhaps eventually respond to increasing environmental restrictions.

Toshimi Minoura, Oregon State University and
Vern Finney, USDA NRCS

Appendices (Tab-ed)

APPENDICES

Assessment of Hosts and Overwintering Sites for Stinkbug Management

Project Title:
Assessment of hosts and overwintering sites for stinkbug management in tomatoes

Project Leader:
Rachael Long
University of California Cooperative Extension
70 Cottonwood, Woodland, .CA 95698
(530)666-8734, FAX:530-666-8736
rflong8ucdavis.edu

Cooperators:

Les Ehler, Entomologist	Department of Entomology, UCD	530-752-0484
Blake Harlan, farmer	37495 Harlan Lane, Woodland	530-952-1327
Fred March, farmer	2413 Anza Ave., Davis	530-761-0466
Jack Meek, farmer	200 Cedar Lane., Woodland	530-662-5895
Cliff Fong, farmer	36868 County Road 20, Woodland	530-662-0812

Budget Total: $5,417

Objective:
Determine whether stinkbugs are feeding and overwintering in hedgerows of shrubs and perennial grasses that growers are planting around fields.

Justification: It is becoming increasingly popular for California farmers to plant hedgerows of flowering shrubs and grasses around their fields to attract beneficial insects for better biocontrol of pests in nearby crops. The idea behind this strategy is that many beneficial insects need nectar and pollen to help them survive and reproduce. By providing floral resources, growers may be able to increase the abundance of beneficial insects on their farms (Long et al. 1998).

While these plantings seem like a good idea, there are few data to support their effectiveness as a good biocontrol tool. For example, we have very little information on the types and numbers of beneficial insects that are using the floral resources. In addition, a concern is that growers may be providing food and habitat for pests such as stinkbugs, a major problem in tomato production.

Stinkbugs overwinter as adults in leaf litter and behind tree bark. The first generation emerges early spring and feeds and builds up primarily on mustard, radish, and cheeseweed. These insects then move into tomatoes where they can cause extensive feeding damage (Ehler et al. in press). We are interested in determining whether the recommended hedgerow plants are encouraging stinkbug activity (through providing food resources) and whether stinkbugs are overwintering in the perennial grasses and shrubs.

If we know which plants enhance stinkbug activity, then these plants will be deleted from our list of recommended plants for hedgerow plantings. This will help reduce stinkbug pressure at that field site. By getting rid of all the preferred hosts, or replacing the preferred hosts with non-host vegetation, we should be able to reduce the stinkbug pressure in nearby tomato fields.

Cost savings to the tomato industry could be substantial. Thousands of dollars are spent each year by growers to control stinkbugs with the use of insecticides. These sprays are sometimes ineffective, disruptive to non-target organisms, and many insecticides are moving offsite from fields into our Delta. This is causing major environmental and political problems for the agricultural industry. We need to find alternative for pest control strategies in tomatoes. This could include determining the

host range and overwintering sites for stinkbugs, and removing this resource either by getting rid of the vegetation, or planting something that stinkbugs will not feed on. This will help break the stinkbug cycle, possibly leading to a reduction in stinkbug pressure and reduced chemical use.

Procedures:

Our field sites will be 4 hedgerows that were planted in Yolo County in 1996. These hedgerows are between 1,000 and 1,800 feet long and consist of a row of perennial broad-leaved plants and a 10 foot wide stand of perennial grasses.

Broad-leaved plants at each site include California lilac, California buckwheat, coffeeberry, coyotebrush, yarrow, milkweed, Toyon and elderberry. We also planted perennial bunchgrasses at each site including deergrass, purple needle grass, blue wildrye, California brorne and Yolo slender wheatgrass. These hedgerows will serve as our experimental sites for monitoring insects.

To determine the insect activity in the hedgerows, monitoring will be done every 2 weeks from March to October. This will be done by visually inspecting two individuals of the aforementioned plant species in each hedgerow for 3 to 5 minutes and recording the types and numbers of insects that visit each plant species. We will also shake each plant onto a sheet of paper to monitor for insects that are hidden in the canopy and flower heads.

Insects recorded will be those of importance to tomatoes. Pest insects will focus on six species of stinkbugs: consperse stinkbug, red shouldered stinkbug, Uhler's stinkbug, conchuela stinkbug, and southern green stinkbug. Beneficial insects monitored will include those that are frequently found in field crops including assassin bugs, big-eyed bugs, beneficial flies (syrphids and tachinids), lady beetles, lacewings, minute pirate bugs, nabids, soldier beetles, and wasps (vespids, brachonids, and ichneumonids). All life stages (larvae, pupae, and adult) of pest and beneficial insects will be recorded.

The perennial grasses will be sampled from January to June when they are active in aboveground growth, every 2 weeks. This will be done by taking 10 sweeps at each site (180"with a 15"diameter net) in 4 different areas of the stand. The numbers and types of insects will be recorded as described above.

We will also document whether stinkbugs are overwintering in the hedgerows. In January and February, we will monitor each hedgerow site for stinkbugs by visually inspecting the leaflitter beneath 2 species of each of the aforementioned hedgerow plants. We will also record numbers of beneficial insects and other pests such as flea beetles and cutworms present in the leaflitter. We will also visually inspect 1 meter square of perennial grass leaflitter in 4 separate areas of the perennial grass stands, for stinkbugs other pests and beneficial insects.

At each of the hedgerow sites we will also look for stinkbug activity in the preferred hosts of mustard, radish, and Malva to determine background levels. That is, we need to demonstrate that stinkbugs are in the vicinity of the hedgerows, but may or may not be using certain type of plants.

Time Table:

Year 1: Year round monitor hedgerow and weedy sites for pest and beneficial insects and analyze data. Write year-end report summarizing data. Write and submit grant proposals for more funding for the project.

Literature Cited

Ehler, L. 2000. Thomas Say Publication Memoirs. (In press)

Long, R., A. Corbett, C. Lamb, C. Reberg-Horton, and M. Stimmann. 1998. Beneficial insects move from flowering plants to nearby crops. California Agriculture 52(5):23-26.

Budget Detail

Exvenses:			Requested Funds (Jan 1- Dec. 31)
Personnel: Field Asst. II	Responsibility: sampling, data management	% time on project: 20% time 12 mos., 8 hrs/wk @ $12.00/hr	$4,992
Employee benefits 6%			$275
Travel (to field sites) (60 mi./day @ $0.32/mi.)			$150
Total			$5,417

The Union School - FARMS Restoration and Education Program

Yolo County Resource Conservation District
221 W. Court St., Suite 1 • Woodland, CA 95695
Phone (916) 662-2037 (916) 662-4876 FAX

Eric Hammerling
National Fish and Wildlife Foundation
28 Second Street, 6th Floor
San Francisco, CA 94105

May 11,2000

Dear Mr. Hammerling,

The Yolo County Resource Conservation District, in partnership with the National Audubon Society – California is pleased to submit the attached grant application and proposal narrative for the USS-FARMS Restoration and Education Program.

The USS-FARMS Restoration and Education Program would integrate and strengthen the existing USS (Union School Slough Watershed Improvement Program) and FARMS (Farming Agriculture and Resource Management for Sustainability) Leadership Program by involving high school students in implementing, managing, and monitoring on-the-ground habitat enhancement projects in a local watershed. Achieving this goal, however, requires expanding our current efforts in both the USS and FARMS programs. Specifically, to involve FARMS students in receiving training and hands-on experience in:

- Revegetating six USS riparian enhancement sites with native plants;
- Constructing and installing wildlife enhancement structures at all project sites; and,
- Evaluating the success of all habitat enhancement through conducting vegetation, water quality, erosion, and wildlife monitoring.

This project, if funded, is a logical extension of the current USS and FARMS efforts in Yolo County. The USS program is a model program for conserving and restoring wildlife habitat in the agricultural landscape of California, and the FARMS Leadership Program is a model program for teaching our youth about the importance of natural resource conservation and the use of environmentally sounds farming and ranching practices.

We are very hopeful that this project will be funded and both USS and FARMS can continue its successful and productive relationship with NFWF.

Sincerely,

Kathryn Pye

Kathryn Pye
Executive Director

National Fish-and Wildlife Foundation Grant Application

NRCS/NACD/NFWF Partnership for Conservation on Private Lands

Deadline: May 15th (received)

Mail to: Eric Hammerling. National Fish and Wildlife Foundation, Southwesr Region Office
28 Second Sheet, 6th Floor, Sam Francisco, CA 94105

APPLICANT INFORMATION

Organization (to be named as Grantee: Yolo County Resource Conservation District (Yolo RCD)
Street: 221 W. Court Street. Suite 1
City, State, Zip: Woodland. CA 95695
Home Page: www.yolorcd.ca.gov

Project Contacts:

Project Officer: Marv Kimball
Tele: (530) 662-2037 em. 3
Fax: (530) 662-4876
E-mail: marvckimball@hotmail.com

Financial Officer: Same
Tele:
Fax:
E-mail:

Tax Status: non-profit (special district) Tax ID#: 94-6000548 Fiscal Year End Date: 6/00
(i.e. non-profit, university, 501(c)(3) etc.)

PROJECT INFORMATION

Project Name: USS-FARMS; Restoring Union School Slough

Location(s) of Project: City: Unincorporated areas surrounding Woodland and Winters
State: Yolo County. CA
country: US
Congressional District(s): District 3 (Doug Ose)

Dates: Project Start Date: July 1. 2000 Project End Date: December 31. 2001
Application Submission Date: May 15. 2000

GRANT REQUEST

Use U.S. dollars *(rounded to the nearest hundred)* for all amounts listed below:

NFWF Funds:	$104.480	(NFWF Federal Funds)
Challenge Funds:	$219.575	(Non-Federal Funds to be Raised by Applicant)
Total Grant Amount:	$324.055	(NFWF Funds + Challenge Funds)

ACRES: *How many acres will be restored and/or acquired with the total grant amount you have requested?*

Number of Acres Restored: 72 (and/or) Number of Acres Acquired N/A

The USS-FARMS Restoration and Education Program
PROPOSAL NARRATIVE

I. Project Summary

The USS-FARMS Restoration and Education Program assists in the establishment of native California riparian plant communities and stock pond wildlife enhancement on currently grazed ranchlands, the restoration of a portion of the slough in the lower reaches of the watershed, and the evaluation of the ecological success of these habitat enhancement projects. These restoration efforts will be undertaken with cooperating private landowners on their farms and ranches in the Union School Slough watershed (USS) by high school students and teachers who are participating in the Farming, Agriculture, and Resource Management for Sustainability (FARMS) Leadership Program and will educate our youth about the importance of natural resource conservation and the use of environmentally sound farming and ranching practices.

11. Project Abstract

The USS-FARMS Restoration and Education Program brings new resources and new partnerships to native plant conservation in California. Building on previously-forged relationships between local landowners (farmers and ranchers), environmental groups, land-use agencies, and education programs, the project melds native plant restoration with economically viable agriculture through proven and practical changes in the management of riparian areas in both the upper and lower watershed.

Union School Slough is a seasonal waterway that drains the foothills of the inner Coast Ranges in Yolo County, California. Once'rich in native grassland and riparian communities, much of the ecosystem has been altered by intensive grazing practices, invasion of exotic vegetation and the "clean farming" strategy of conventional agricultural production systems. Loss of native plant cover in the riparian areas of both the upper and lower USS have contributed to large scale erosion, degradation of water quality, and loss of biodiversity and quality habitat for wildlife species.

In April of 1999, Audubon-California together with the Yolo County Resource Conservation District launched the Union School Slough Watershed Improvement Program. A partnership between local landowners, local agencies, and the project sponsors, the goal of the program is to achieve multiple benefits by managing natural resources in an integrated manner on individual farms and ranches across the watershed.

Since 1993, the FARMS Leadership Program has used education based on sustainable agriculture and natural resource conservation as a platform to heip high school students make informed choices about their futures. The FARMS Leadership Program conducts hands-on workshops year-round in the best possible learning laboratory; out of the classroom and onto farms, ranches, and wildlife areas. Each year, activities based on native plant restoration and natural resource conservation in the community have become increasingly important to the overall program.

The USS-FARMS Restoration and Education Program would integrate and strengthen the USS and FARMS programs by involving high school students in implementing, managing, and monitoring on-the-ground habitat enhancement projects in a local watershed. Achieving this goal, however, requires expanding our current efforts. Specifically, to involve FARMS students in receiving training and hands-on experience in.

- Revegetating six USS riparian enhancement project sites with native plants (Total - 70 acres).
- Constructing and installing wildlife enhancement structures such as bird and bat boxes, brush piles, floating nesting structures, and raptor perches at all project sites.
- Evaluating *the* success of habitat enhancement projects through conducting vegetation, water quality, erosion, and wildlife monitoring.

LETTERS OF SUPPORT

Farmers/Landowners
- Michele Defty
- Dave Batcheller
- Tony Turkovich
- Bruce Rominger
- Daniel Hrdy
- John Anderson
- Scott Stone
- Duane Chamberlain
- Rich Stewart

Community
- Lois Wolk, Yolo County Board of Supervisors
- Yolo County Farm Bureau (Duane Chamberlain)
- Jim Eagan, Manager, Yolo Cty. Flood Control and Water Cons. Dist.

University
- Mike McCoy, Co-Director, Information Center for the Environment
- Rachael Long, UC Cooperative Extension Farm Advisor
- Jeff Mount, Director, Center for Integrated Watershed Science and Management

State
- Jeffrey R. Vonk, State Conservationist
- Dr. Syed M. Ali, Chief, State Water Resources Control Board, Division of Water Quality

Legislator
- Assemblywoman Helen Thomson
- Assemblyman Dick Dickerson
- Congressman Doug Ose
- State Senator Maurice Johannessen

Tom Muller
Yolo County Resource Conservation District
221 West Court Street #1
Woodland, CA 95695

May 3, 2000

Dear Mr. Muller,

As a landowner in the Union School Slough Watershed, I would like to express my interest in participating in the expanded Union School Slough Watershed Improvement Program. I would be particularly interested in installing hedgerows as part of a slough erosion prevention project, along with planting native grasses as a means of controlling weeds, and a variety of other projects on my property as part of the program.

Please contact me when your proposal is approved.

Sincerely,

Michele Defty

Yolo County RCD/Audubon California
Proposed extension of the Union School Slough Watershed Improvement Program

The proposed project extension is part of ongoing implementation of the Willow Slough Watershed Integrated Resources Management Plan. extensions of our experiences working on other projects with county growers. and activities growers have expressed interest in doing on their land. but for which they lack funding or assistance. Our goal in the Union School Slough Watershed is to get some basic data on slough hydrology. invasive species. and sources (and solutions) of erosion and nutrients

Please check off any projects on the list below that are of interest and fill out the bottom of the form. **Indicating an interest now does not obligate your participation later.**

We look forward to potentially working with you. Please contact us if you have any questions or comments and return the form in the enclosed envelope **by May 10th**.

Check everything of interest to you for which you would like assistance

___ Cover crop installation and winter runoff evaluation
___ Conservation tillage trial and winter runoff evaluation
1/ Hedgerow installation (in a system to promote beneficial insects for crops and stabilize slough banks. Includes native grasses and rushes plus woody species. Designed to fit your specific site.)
1/ Soil loss measurements and sediment trap installation (where fields drain into the slough or Winters Canal)
___ Tailwater pond water monitoring
1/ Conservation planning assistance (learning about conservation practices for your property. site selection. installation. permitting (only applies to riparian restoration) and maintenance information. how to get even more funding for your projects.
1/ Invasive weed species eradication and control experiments in slough channel
___ Stream water-quality monitoring (sediment and nutrients only) along entire slough

Name: Jonathan & Michele Defty Phone: 661 0659

Address 23509 County Rd 95 Woodland

Parcels where you would like assistance (optional) _____

Comments: any additional help / interest is quite welcome! (3)

Tom Muller, President
Yolo County Resource Conservation District
221 West Court St #1
Woodland, Ca 95695

May 2, 2000

Dear Mr Muller,

As a landowner in the Union School Slough Watershed, I would like to express my interest in participating in the expanded Union School Slough Watershed Improvement Program. I would be particularly interested in conservation planning assistance with the installation and maintenance of tailwater ponds and hedgerows that promote beneficial insects and wildlife.

Please contact me when your proposal is approved.

Sincerely,
Dave Batchelder

Yolo County RCD/Audubon California

Proposed extension of the Union School Slough Watershed Improvement Program

The proposed project extension is part of ongoing implementation of the Willow Slough Watershed Integrated Resources Management Plan, extensions of our experiences working on other projects with county growers, and activities growers have expressed interest in doing on their land, but for which they lack funding or assistance. Our goal in the Union School Slough Watershed is to get some basic data on slough hydrology, invasive species, and sources (and solutions) of erosion and nutrients

Please check off any projects on the list below that are of interest and fill out the bottom of the form. **Indicating an interest now does not obligate your participation later**.

We look forward to potentially working with you. Please contact us if you have any questions or comments and return the form in the enclosed envelope **by May 10th**.

Check everything of interest to you for which you would like assistance

____ Cover crop installation and winter runoff evaluation
____ Conservation tillage trial and winter runoff evaluation
_X_ Hedgerow installation (in a system to promote beneficial insects for crops and stabilize slough banks. Includes native grasses and rushes plus woody species. Designed to fit your specific site.)
____ Soil loss measurements and sediment trap installation (where fields drain into the slough or Winters Canal)
_X_ Tailwater pond water monitoring
_X_ Conservation planning assistance (learning about conservation practices for your property, site selection, installation, permitting (only applies to riparian restoration) and maintenance information, how to get even more funding for your projects.
_X_ Invasive weed species eradication and control experiments in slough channel
____ Stream water-quality monitoring (sediment and nutrients only) along entire slough

Name: DAVE BATCHELLER Phone: (916) 535-2414

Address 30613 CO RD 28 WOODLAND CA 95695

Parcels where you would like assistance (optional) _____

Comments: _____

BUTTON & TURKOVICH
24604 **Buckeye** Road
Winters, California 95694-9001
(530)795-2090 FAX (530)795-3331

Tom Muller, President
Yolo County Resource Conservation District
221 West Court Street, #1
Woodland, CA 95695

May 8,2000

Dear Mr. Muller,

As a farmer in the Union School Slough Watershed, I would like to express my interest in exploring the benefits of participating in the expanded Union School Slough Watershed Improvement Program. I would be particularly interested in installing invasive weed species eradication and control experiments in slough channel and stream water-quality monitoring (sediment and nutrients only) along entire slough on my property as part of the program.

Please contact me when your proposal is approved.

Sincerely,

TONY TURKOVICH

Yolo County RCD/Audubon California

Proposed extension of the Union School Slough Watershed Improvement Program

The proposed project extension is part of ongoing implementation of the Willow Slough Watershed Integrated Resources Management Plan. extensions of our experiences working on other projects with county growers, and activities growers have expressed interest in doing on their land, but for which they lack funding or assistance. Our goal in the Union School Slough Watershed is to get some basic data on slough hydrology, invasive species, and sources (and solutions) of erosion and nutrients

Please check off any projects on the list below that are of interest and fill out the bottom of the form. **Indicating an interest now does not obligate your participation later.**

We look forward to potentially working with you. Please contact us if you have any questions or comments and return the form in the enclosed envelope **by May 10th**.

Check everything of interest to you for which you would like assistance

___ Cover crop installation and winter runoff evaluation
✓ Conservation tillage trial and winter runoff evaluation
___ Hedgerow installation (in a system to promote beneficial insects for crops and stabilize slough banks. Includes native grasses and rushes plus woody species. Designed to fit your specific site.)
✓ Soil loss measurements and sediment trap installation (where fields drain into the slough or Winters Canal)
✓ Tailwater pond water monitoring
___ Conservation planning assistance (learning about conservation practices for your property, site selection, installation, permitting (only applies to riparian restoration) and maintenance information, how to get even more funding for your projects.
✓ Invasive weed species eradication and control experiments in slough channel
✓ Stream water-quality monitoring (sediment and nutrients only) along entire slough

Name: Butch Turkovich Phone: 530-795-2090

Address 24604 Buckeye Rd. WINTERS CA. 95694

Parcels where you would like assistance (optional) WEST SIDE Rd. 96 NORTH SIDE of Slough

Comments:

ROMINGER BROTHERS FARMS

RICK S. ROMINGER CHARLES A. ROMINGER BRUCE J. ROMINGER
28800 Count! Road 29, Winters. CA. 95694 Phone (520) 668-1558 Fax (530) 669-681 :

Tom Muller, President
Yolo county resource Conservation District
221 West Court Street, #1
Woodland, CA. 95695

May 8,2000

Dear Mr. Muller,

As a landowner and farmer in the Union School Slough Watershed, I would like to express my interest in participating in the expanded Union School Slough Watershed Improvement Program. I would certainly be interested in installing tailwater ponds, sediment basins and hedgerows on my property as part of the program.

Please contact me when your proposal is approved.

Sincerely,

Bruce J. Rominger

Bruce J. Rominger

Yolo County RCD/Audubon California

Proposed extension of the Union School Slough Watershed Improvement Program

The proposed project extension is part of ongoing implementation of the Willow Slough Watershed Integrated Resources Management Plan, extensions of our experiences working on other projects with county growers, and activities growers have expressed interest in doing on their land, but for which they lack funding or assistance. Our goal in the Union School Slough Watershed is to get some basic data on slough hydrology, invasive species, and sources (and solutions) of erosion and nutrients

Please check off any projects on the list below that are of interest and fill out the bottom of the form. **Indicating an interest now does not obligate your participation later**.

We look forward to potentially working with you. Please contact us if you have any questions or comments and return the form in the enclosed envelope **by May 10th**.

Check everything of interest to you for which you would like assistance

___ Cover crop installation and winter runoff evaluation
✓ Conservation tillage trial and winter runoff evaluation
✓ Hedgerow installation (in a system to promote beneficial insects for crops and stabilize slough banks. Includes native grasses and rushes plus woody species. Designed to fit your specific site.)
✓ Soil loss measurements and sediment trap installation (where fields drain into the slough or Winters Canal)
✓ Tailwater pond water monitoring
___ Conservation planning assistance (learning about conservation practices for your property, site selection, installation, permitting (only applies to riparian restoration) and maintenance information, how to get even more funding for your projects.
___ Invasive weed species eradication and control experiments in slough channel
___ Stream water-quality monitoring (sediment and nutrients only) along entire slough

Name: Rominger Brothers Farms Phone: (530) 668-1558

Address 28800 County Road 29, Winters, CA. 95694

Parcels where you would like assistance (optional)

Comments:

DANIEL B. HRDY. M.D.
21440 ROAD 87
WINTERS, CALIFORNIA 95694
PHONE (530) 661-9225 FAX (530) 661-3633

April 24,2000

Judy Boshoven
Watershed Coordinator
Audubon-California
221 W. Court St., Ste. 1
Woodland, CA 95695

Dear Ms. Boshoven,

We support the goals of the proposed Willow Slough Rangeland Stewardship project for which you are seeking funding. We own 1,080 acres in the Willow Slough watershed and are interested in working with your organization, the Yolo County Resource Conservation District, and others to determine appropriate, voluntary conservation measures that will help restore our land to better environmental and economic health.

Sincerely,

Daniel B. Hrdy. M.D.

DBH/gm

Yolo County RCD/Audubon California

Proposed extension of the Union School Slough Watershed Improvement Program

The proposed project extension is part of ongoing implementation of the Willow Slough Watershed Integrated Resources Management Plan, extensions of our experiences working on other projects with county growers, and activities growers have expressed interest in doing on their land, but for which they lack funding or assistance. Our goal in the Union School Slough Watershed is to get some basic data on slough hydrology, invasive species, and sources (and solutions) of erosion and nutrients

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___ Soil loss measurements and sediment trap installation (where fields drain into the slough or Winters Canal)
___ Tailwater pond water monitoring
__✓ Conservation planning assistance (learning about conservation practices for your property, site selection, installation, permitting (only applies to *riparian restoration*) and maintenance information, how to get even more funding for your projects.
__✓ Invasive weed species eradication and control experiments in slough channel
__✓ Stream water-quality monitoring (sediment and nutrients only) along entire slough

Name: DANIEL B HADY Phone: 530 661 6215

Address 21440 RD 87 WINTERS CA 95694

Parcels where you would like assistance (optional) 50-090-01, 50-090-07, and others

Comments:

HAVE SENT SUPPORT LETTER TO TUBY ALREADY

May 12,2000

Tom Muller, Chairman
Board of Directors
Yolo County RCD
221 W. Court St. Suite 1
Woodland, CA 95695

Dear Tom:

As a long time implementer and advocate of farmland conservation practices in Yolo County, we at Hedgerow Farms are highly supportive of the RCD's Cal fed proposal to continue on the course established over the past few years. The current RCD/Audubon grant is an obvious success in implementation and landowner outreach, but it is just a small beginning to what should expand to 2 much larger scale wetershed wide. land stewardship program. The current grant is essential to take the program to the next level and we endorse it without question. Good luck and let us know how we can assist in the future.

Sincerely yours,

John H. Anderson

Marsha A. Anderson

21710 COUNTY ROAD 88 WINTERS, CA 95694 530 (916) 662-4570

Yolo County RCD/Audubon California

Proposed extension of the Union School Slough Watershed Improvement Program

The proposed project estension is **part** of ongoing implementation of the Willow Slough Watershed Integrated Resources Management Plan, extensions of our experiences working on other projects with county growers, and activities growers have espressed interest in doing on their land, but for which they lack funding or assistance. Our goal in the Union School Slough Watershed is to get some basic data on slough hydrology, invasive species, and sources (and solutions) of erosion and nutrients

Please check off any projects on the list below that are of interest and fill out the bottom of the form. Indicating an interest **now** does **not** obligate your participation later.

We look forward to potentially working with you. Please contact us if you have any questions or comments and return the form in the enclosed envelope by May 10th.

Check everything of interest to you for which you would like assistance

____ Cover crop installation and winter runoff evaluation
____ Conservation tillage trial and winter runoff evaluation
____ Hedgerow installation (in a system to promote beneficial insects for crops and stabilize slough banks. Includes native grasses and rushes plus woody species. Designed to fit your specific site.)
____ Soil loss measurements and sediment trap installation (where fields drain into the slough or Winters Canal)
____ Tailwater pond water monitoring
____ Conservation planning assistance (learning about conservation practices for your property. site selection. installation, permitting (only applies to riparian restoration) and maintenance information. how to get even more funding for your projects.
Invasive weed species eradication and control esperiments in slough channel
Stream water-quality monitoring (sediment and nutrients only) along entire slough

_____
_____

Name: _____ Phone: _____

Address _____

Parcels where you would like assistance (optional) _____

Comments: _____

_____

_____

_____

_____

_____

May 4,2000

Mrs. Judy Boshoven
Watershed Coordinator
Audubon-California
C/O Yolo County RCD
221 W. Court Street, Suite 1
Woodland. Ca. 95695

Dear Judy:

Thank you for your call the other day. Of course I am interested in supporting Audubon California and the Yolo County Resource Conservation District in their grant proposals. My family owns a 7,500 acre cattle ranch, and have participated in developing projects for habitat enhancement of stockponds, and prescribed burning of grasslands to control weeds under the Union School Watershed Improvement Program. We have been extremely pleased with the assistance that program provided in securing cost-share funding from the Department of Fish and Game's Wildlife Conservation Board for our projects.

I understand that, if the proposals are funded, I would possibly have the opportunity to continue to continue to work with Audubon, the RCD, and others to determine Additional appropriate range-land improvement projects and conservation measures for our property. We are interested in using remote sensing technology and ground-based monitoring to assess forage production and quality and developing conservation plans for our ranches.

Sincerely,

Scott A. Stone, Partner

YOLO LAND & CATTLE COMPANY
37874 COUNTY ROAD 28
WOODLAND, CA. 95695

Chamberlain Farms

34530 County Road 29 Woodland, California 95695
(916) 662-2620

May 12,2000

Tom Muller, President
Yolo County Resource Conservation District
221 West Court Street, #1
Woodland, CA 95695

Dear Mr. Muller,

As a farmer in the Union School Slough Watershed, I would like to express my interest in participating in the expanded Union School Slough Watershed Improvement Program. I would be particularly interested in installing a sediment trap on my property as part of the program.

Please contact me when your proposal is approved,

Sincerely,

Duane Chamberlain

Duane Chamberlain

May 3, 2000

Judy Boshoven
Watershed Coordinator
Audubon-California
c/o Yolo County RCD
221 W. Court Street, Suite 1
Woodland CA 95695

Dear Judy:

My partners and **I** are pleased to support the Audubon Society and the Yolo County Resource Conservation District in their grant proposals. We **own** a cattle ranch in the upper watershed of **Union** School ***Slough.***

Under the Union School Slough Watershed Improvement Program, we have fenced an approximately 50-acre riparian pasture, and have begun to plant areas within the pasture with native trees. The program has also assisted us with conducting experiments to control streambank and gully **erosion,** and implementing prescribed burns and reseeding with native perennial grasses.

If the next-phase of the program is funded, we would be especially interesting using remote sensing technology and ground-based monitoring ***to*** assess forage production and **quality** and developing conservation plans for OUT properiy. We would also be interested in the possibility of conducting additional prescribed burns, and enhancing stockponds for wildlife habitat. **We** understand that if the program is funded it will provide Audubon and the **Yolo** RCD with expanded opportunities to monitoring existing conservation activities **on** OUT ranch to potentially improve the success of such projects in the watershed.

Sincerely,

Richard Stewart

LOIS WOLK
Supervisor, Second District
Yolo County Board of Supervisors

625 Court Street, Room 204
Woodland, **CA** 95695-3448

Office (530) 666-8622
Residence (530) 756-9655
Fax (530) 666-8193
email: lgwolk@dcn.davis.ca.us

May 12,2000

Ms. Wendy Halverston-Martin
CALFED Bay-Delta Program
1416 9" Street
Sacramento, CA 95814

Dear Ms. Halverston-Martin:

I write in support of the application of the RCD proposal "Sustaining Agriculture Beyond the Riparian Corridor."

I have been a Yolo County Supervisor since January, 1999 and am currently Chair of the Board. I serve as Board liaison to many committees and commissions including Putah Creek Watershed issues and the *Parks,* Recreation and Wildlife Committee. I helped organize Tree Davis, the Yolo Basin Foundation, and the Yolo Land Trust. I have recently proposed the formation of the County/Cities Open Space Task Force and have a particular interest in environmental issues.

The Yolo RCD has a history of forming partnerships with many diverse organizations and agencies, becoming a model for building an integrated set of land-use and environmental solutions within an agricultural landscape. Additional funding will assist the RCD in expanding their education and outreach programs and provide new data on successful habitat management practices.

It is important that agriculture and the environment work together to meet the goals of both. Yolo RCD has demonstrated many successes in working with the practical needs of agriculture and the visionary ideas of the environmental community.

I whole-heartedly endorse this proposal, and have no reservations regarding it. Thank you for your consideration.

Sincerely,

Lois Wolk, Chair
Yolo County Board of Supervisors

American Farm Bureau Federation/California Farm Bureau Federation

YOLO COUNTY FARM BUREAU

P.O. Box 1556. Woodland, California 95776
*(530)*662-6316 • FAX (530) 662-8611

May 11,2000

Rebecca Fawver
CALFED Bay-Delta Program
1416 9th St
Sacramento, CA 95814

Dear Ms. Fawver:

The Yolo County Farm Bureau is pleased to support National Audubon Society-California (Audubon) and Yolo County Resource Conservation District (Yolo RCD) efforts to secure additional program funding for conservation practice development and implementation activities within the Willow Slough Watershed.

Over the past years the Yolo RCD and its farm and ranch cooperators have been working to solve watershed problems without limiting growers' and ranchers' operational and economic choices. We have been pleased to watch this cooperative venture evolve with the addition of the Union School Slough Watershed Improvement Program in 1998. This program, initiated by Audubon, is working effectively with the RCD and local landowners and operators to address resource issues, while providing wildlife habitat and improving water quality.

We feel strongly that the RCD and Audubon have a clear vision of, and are demonstrating daily, how agriculture and the environment can work together to meet multiple, and often competing, goals. We are excited by the opportunity to gain additional funding for demonstration projects, basic resource assessments, farming and wildlife data, and practical conservation tools the agricultural community needs to continue making improvements to our farms, ranches, and watersheds. Our cooperative efforts have proven extremely useful to a number of our members and we look forward to what is yet to come.

The Yolo County Farm Bureau strongly urges your support of the Audubon Society and Yolo RCD projects.

Sincerely,

Duane Chamberlain
President

Effective water resource management

YOLO COUNTY
FLOOD CONTROL & WATER CONSERVATION DISTRICT

May 12,2000

Tom Muller, President
Yolo County Resources Conservation District
221 W. Court Street, #1
Woodland, California 95695

Dear Mr. Muller:

Over the past six years, the RCD and the Yolo County Flood Control & Water Conservation District have cooperated on a number projects in the county to reach our mutual goals of water conservation. As with previous projects, we would like to lend our support for your Union School Slough Watershed water quality, wildlife habitat and monitoring program with in-kind contribution of $35,000 of earthwork for constructing sediment traps and removing weedy vegetation on the slough. Any efforts to reduce sediment movement off farms and into our canals, whether by trap ponds or vegetation projects, make our canal maintenance and water delivery work easier. We look forward to continuing our work together.

Sincerely yours,

James F. Eagan
General Manager

34274 State Highway 16
Woodland, CA 95695-9371
(530) 662-0265
FAX (530) 662-4982

General Manager
James F. Eagan

Mike McCoy, Co-Director
Information Center for the Environment
Department of Environmental Science and Policy
University of California, Davis

5/12/00

Dear Katy Pye,

I am pleased to accepl your offer to act as an advisor to your proposed CALFED project. Your concept of enabling landowners and other stakehotders to develop and execute appropriate actions for the abatement ofnon-point source pollution is consistent with everything I have learned about the political climate, scientific knowledge and resource constraints in this area since my appointment as Principal Investigator of the California Rivers Assessment in 1993.

I believe it is not possible to conceptualize a program of restoration in the Bay-Delta in which agriculture does not assume a role as an active partner in the improvement of water quality and wildlife habitat. It has also been my experience that the rapid adoption of information technology by all sectors of society has provided us with exciting new methods for outreach and distributed participation in landscape scale conservation and management efforts. Our Information Center for the Environment fulfills thousands of requests daily for natural resource information. Our interactive mapping product alone is accessed by over 20,000 users per week. Information without analysis is not enough though and the analytic and prescriptive tools that you plan to offer are what is really needed to encourage and enhance the involvement of large sectors of society.

As a result of my enthusiasm for your project I would be happy to commit my time to your guidance committee. Even though I am Principal Investigator or Project Manager on 18 grants of my own I would be happy to give 2 to 3 weeks per year to bring my experience together with yours and your partners in helping insure the success of *your* well conceived project.

With best regards,

Date: Fri, 12 May 2000 10:40:42 -0700
To: topquail@yolorcd.ca.gov
From: Jeffrey Mount <mount@geology.ucdavis.edu>
Subject: CALFED Support Letter
CC: Ellen Mantalica <Mantalica@Crocker.ucdavis.edu>

May 12,2000

Ms. Katie Pye
Yolo RCD

Re: Yolo RCD Project

Katie,

The UC Davis Center for Integrated Watershed Science and Management is pleased to offer support for the Yolo RCD Project, "Sustaining Agriculture and Habitat, Beyond the Riparian Corridor." This project appears to be the logical next phase for your current CALFED-funded "Union School Slough Improvement Project". Your current collaborative work with the Audubon Society and farmers in the area is a model for how environmental groups and agricultural interests can work closely to resolve seemingly intractable problems.

I am happy to offer the technical expertise of Watershed Center personnel for peer review of the design and implementation of your project. We believe that projects like yours, which involve collaboration from a wide range of stakeholders and decisionmakers, are likely to be most viable in the long run. We also will support your efforts to adopt the ONEPLAN concept as a planning tool for the watershed.

I strongly endorse your efforts to address key management issues in the Willow Slough Watershed and look forward to working closely with you as this project goes forward.

Sincerely,

Jeffrey Mount
Director, UC Davis Center for Integrated Watershed Science and Management

[] Jeffrey F. Mount
[] Professor
[] Department of Geology
[] and
[] Director, Center for Integrated
[] Watershed Science and Management
[] University of California

Davis, **CA** 95616
office: 530-752-7092
fax:752-0951

****

"ten thousand river commissions, with the mines of the world at their back, cannot tame that lawless stream, cannot curb it or confine it, cannot say to it 'Go Here' or 'Go There', and make it obey; cannot save a shore which it has sentenced; cannot bar its path with an obstruction which it will not tear down, dance over and laugh at. But a discreet man will not put these things into spoken words;"

Mark Twain
Life on the Mississippi

****

USDA United States Department of Agriculture

Natural Resources Conservation Service

430 G Street
Davis, CA 95616-4164
(530) 792-5606
FAX (530) 792-5790

May 10,2000

Ms. Wendy Halverson-Martin, Ecosystem
Restoration Program Manager
CALFED
1416 9th Street, Suite 1155
Sacramento, California 95514

Dear Ms. Halverson-Martin:

Subject: Letter of Support for Yolo RCD (ERP 2001 PSP)

The Natural Resources Conservation Service (NRCS) recommends funding Yolo Resource Conservation District's (RCD) proposal "Sustaining Agriculture and Wildlife Beyond the Riparian Corridor". We feel that it exemplifies a solid understanding of agriculture and the issues around farming adjacent to riparian corridors. The Yolo RCD has a long and proven track record of accomplishment in working in this complex area.

The objectives, once accomplished, will provide a model for agricultural regions throughout the Bay-Delta, and, other parts of California. The implementation of real world solutions in the Willow Slough Watershed Integrated Resources Management Plan (an important contributor to the health of the Yolo basin ecological unit and the Bay-Delta ecosystem), continued implementation of the second year of the Union School Slough Enhancement Program, and the expansion of the Yolo RCD website to include an interactive OnePlan, will make the results readily available to local producers, other agricultural industry members, and also to CALFED researchers and affiliates.

We anticipate partnering with both Yolo RCD and CALFED on this proposal.

Sincerely,

State Conservationist

Winston H. Hickox
Secretary for Environmental Protection

State Water Resources Control Board

Division of Water Quality
901 **P** *Street.* Sacramento, **California 95814 - (916)657-0887**
Mailing **Address:** P.O. Box 944213 .Sacramento, California. **94244-2130**
FAX (916)654-8375- Internet Address: hnp://wvnv.swcb.ca.gov

Gray Davis
Governor

MAY 09 2000

Ms. Rebecca Fawber
CALFED
14169" Street, Suite 1155
Sacramento, CA 95814

Dear Ms. Fawber:

YOLO COUNTY RESOURCE CONSERVATION DISTRICT'S PROPOSAL FOR CALFED FUNDING

I am delighted to provide a vigorous endorsement of the Yolo County Resource Conservation District's (RCD) proposal to CALFED. Several staff from State Water Resources Control Board's (SWRCB) Division of Water Quality had the opportunity of working with RCD personnel as a Grassroots Team. The SWRCB staff collaborated in the field with RCD personnel on practices aimed at protecting, enhancing, and restoring stream ecosystems (including water quality), wildlife habitat, and native vegetation that simultaneously allowed for profitable and sustainable agricultural production. Thus, SWRCB staff has first-hand experience and knowledge of the RCD's expertise, competence, and accomplishments.

Agricultural practices have some indirect impacts on natural resources. We view the approaches and practices being developed, advocated, and implemented by the RCD as effective solutions for eliminating or reducing the impacts of agriculture on natural resources within the Bay-Delta region.

The RCD's proposal contains essential components of resource management. The baseline watershed assessment is critical for directing focus of the proposed environmental protecting, enhancing, and restoring activities. The activities/practices to be propagated have a high potential, or have been proven to improve environmental quality, and these include: (1) hedgerow buffer corridors of native plants to create wildlife habitat, attract beneficial insects, stabilize stream banks, and enhance scenic value, (2) sediment traps and irrigation tailwater ponds to manage runoff water reducing offsite movement of sediment, nutrients; provide wildlife habitat, and enhance groundwater recharge, **(3)** vegetation of irrigation canal banks to stabilize and decrease erosion, reduce weed invasion of crops and decrease the use of herbicides, cleanse water, and provide wildlife habitat, and (4) a focused and broad education and outreach program, for which the RCD is already well-known.

A further important component of the RCD proposal is assessing effectiveness of these practices. **A** commendable and critical aspect of this proposal is the economic cost/benefit analysis for the practices intended to restore stream ecosystems, wildlife habitat, and native vegetation. The Yolo OnePlan that the RCD proposes to develop is an exciting and very promising conservation tool for assisting farmers and ranchers in planning and managing their activities.

We have been impressed with the intelligence, technical soundness, creativity, enthusiasm, diligence, devotion, and focus of the RCD personnel. Other major strengths of the RCD are their rapport with growers and demonstrated ability to work cooperatively with government agencies and form partnerships with other entities.

Based on SWRCB staff work experience with the RCD, I am confident that their project will be extremely successful and valuable. The SWRCB's confidence in the RCD's capabilities was one of the major reason for awarding of two Clean Water Act Section 319 grants to implement water quality improvements and coordinate with other agencies regarding watershed assessments, permitting, and implementation. I urge CALFED to support the RCD's proposal.

Please call me at (916) 657-0887 if you have any questions on this subject.

Sincerely,

Syed Ali

Dr. Syed M. Ali, Chief
Water Quality Planning Section
Division of Water Quality

STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0008
(916) 319-2008
FAX (916) 319-2108

SOLANO COUNTY
555 MASON STREET, SUITE 275
VACAVILLE, CA 95688
(707) 455-9325
FAX (707) 455-0490

YOLO COUNTY
712 MAIN STREET
WOODLAND, CA 95695
(530) 662-7997
FAX (530) 669-0770

e-mail
helen.thomson@assembly.ca.gov

website
http://www.assembly.ca.gov/thomson/

Assembly California Legislature

HELEN MACLEOD THOMSON
ASSEMBLWOMAN. EIGHTH DISTRICT
ASSISTANT SPEAKER PRO TEMPORE

CHAIR
SELECT COMMITTEE ON MENTAL HEALTH

CO-CHAIR
LEGISLATIVE ETHICS COMMITTEE

STANDING COMMITTEES
AGRICULTURE
APPROPRIATIONS
HEALTH
LOCAL GOVERNMENT
WATER, PARKS, AND WILDLIFE

SELECT COMMITTEES
CALIFORNIA PORTS
CALIFORNIA WINE
INDIAN GAMING
NATIVE AMERICAN REPATRIATION
RURAL ECONOMIC DEVELOPMENT
SCHOOL FACILITIES FINANCE

JOINT COMMITTEE
FAIRS ALLOCATION AND CLASSIFICATION

May 9, 2000

Ms. Rebecca Fawver
CALFED Bay-Delta Program
1416 9th Street
Sacramento, CA 95814

Dear Ms. Fawver:

I write to encourage CALFED's support of the Yolo County Resource Conservation District's (RCD) proposal 'Sustaining Agriculture Beyond the Riparian Corridor." In my view, this is the ideal proposal to follow up on the success of the currently CALFED-funded "Union School Slough Watershed Improvement Program."

Committed to innovative watershed stewardship and forming productive partnerships. the Yolo RCD's success and leadership make it one of the top-performing RCDs in the state. The on-farm conservation practices the district developed in its Willow Slough Watershed plan, for example, have become a model for building an integrated set of land-use and environmental solutions within an agricultural landscape. Funding for Yolo RCD's latest proposal will greatly expand their education and outreach program and provide important new data on successful habitat management practices.

Finally, I believe the district's current proposal will assist CALFED in its struggle to involve agricultural interests in its ecosystem restoration efforts and will provide them with a needed degree of assurance about the direction CALFED is headed. If CALFED is going to realize solutions, "beyond the riparian corridor" it must do so while sustaining long-term agricultural uses and the involvement of agricultural interests. The Yoio RCD brings an unequalled history of success, the demonstrated ability to bridge this vision with the practical needs of farmers and ranchers, and to complete the tasks it takes on. Thus, I offer my unqualified endorsement the Yolo RCD and this proposal.

Sincerely,

Helen M. Thomson,
Assemblywoman, 8" District

HMT:gct

Assembly
California Legislature

DICK DICKERSON
ASSEMBLYMAN. SECOND DISTRICT

CAPITOL ADDRESS:
STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0001
(916) 319.2002
FAX (916) 319-2102

DISTRICT OFFICE
100 EASTCYPRESS AVENUE
SUITE 100
REDDING, CA 95002
(530) 223.6300
FAX (530) 223-6737

May 11,2000

Rebecca Fawver
CALFED Bay-Delta Program Office
1416 Ninth St., Ste. 1155
Sacramento, CA 95814

Dear Ms. Fawver:

I would like to voice my support for the proposal submitted *to* you by the Yolo County Resource Conservation District entitled "Sustaining Agriculture and Wildlife beyond the Riparian Corridor."

As Vice-chairman of the Water Parks and Wildlife committee and with my district covering from the delta approaches to the top of the primary watersheds, I am particularly interested in total watershed solutions beyond the riparian corridors.

The project that the Yolo RCD proposes seems to address the key natural resource issues defined in the County's "Willow Slough Watershed Integrated Resources Management Plan. These include bio-diversity, wildlife habitat, water quality, and agricultural sustainability. You include these issues in the CALFED Ecosystem Restoration Program Plan, which identifies this slough and the larger watershed which contains the Union School Slough Watershed as being a key component contributing to the health of the Bay Delta ecosystem.

I am assured that this project will actively engage farmers, landowners, and land managers to accomplish the very kinds of water quality and habitat solutions that CALFED seeks. This is a particularly important project in that it engages the agricultural community key to any solutions for the Delta.

I urge your support of this very reputable Resource Conservation District with a proven track record of on the ground successes embraced by local farmers.

Sincerely,

Dick Dickerson

DICK DICKERSON, Assemblyman

DOUG OSE
THIRD DISTRICT, CALIFORNIA

AGRICULTURE COMMITTEE

BANKING AND FINANCIAL SERVICES COMMITTEE

GOVERNMENT REFORM COMMITTEE

Congress of the United States
House of Representatives

Washington, DC 20515–0503

WASHINGTON OFFICE:
1506 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225–5716
FAX: (202) 2261296

DISTRICT OFFICE:
722–B MAIN STREET
WOODLAND, CA 95695
(530) 669–3540
(916) 489–3664
FAX: (530) 669–1395
www.house.gov/ose
doug.ose@mail.house.gov

May 12,2000

Rebecca Fawver
CALFED Bay-Delta Program Office
1416 Ninth St., Ste 1155
Sacramento, CA 95814

Dear Ms. Fawver:

I am writing to support Yolo County Resource Conservation District's (RCD) CALFED grant request entitled "Sustaining Agriculture and Wildlife Beyond the Riparian Corridor." The proposal will secure additional program funding for the continued practice of conservation development and implementation activities within the Willow Slough Watershed.

The proposed project extension of the Union School Slough Watershed Improvement Program is part of the ongoing implementation of the Willow Slough Watershed Integrated Resources Management Plan, which is a partnership between the Yolo RCD, National Audubon Society-California and county landowners. The Union School Slough Watershed funding will be used to gather basic data on slough hydrology, invasive species, and sources of erosion and nutrients. The project embraces conservation practices that are compatible with productive farmland and implemented on a voluntary basis.

I wholeheartedly support actions to improve the health of watersheds in my district that are accomplished in a prudent and feasible manner that have no adverse impacts to farmers and ranchers. To accomplish this, the continuation of data analysis and conservation tools need to be developed. Thank you for your consideration of this request. If you have any questions, please feel free to contact Julie Lillywhite on my staff, at (530) 669-3540.

Sincerely,

DOUG OSE
Member of Congress

DO/jsl

California State Senate

SENATOR
K. MAURICE JOHANNESSEN
FOURTH SENATORIAL DISTRICT

May **15, 2000**

Ms. Rebecca Fawver
CALFED Bay-Delta Program Office
1416 Ninth St., Suite 1155
Sacramento, CA 95814

Dear Ms. Fawver:

It is with pleasure that I offermy support for the grant application for **the** Yolo **County** Resource Conservation District's proposal **"Sustaining** Agriculture and Wildlife Beyond the Riparian Corridor".

The proposal builds **upon** and expands an existing, previously funded CALFED proposal along Union School Slough in Yolo County with actively participating landowners. It also supports the completion **of** Yolo County's Willow Slough Watershed Integrated Resource Management **Plan,"** of which Union School is a sub-watershed. The practices and approaches are scientifically sound, designed to increase landowner awareness and participation, and ***are*** transferable and adaptable to other CALFED Bay-Delta agricultural landscapes.

It is critical to recognize that in order to improve water quality and wildlife conditions in the Bay-Delta plan area, CALFED must welcome agriculture as an *active* partner.

Your serious consideration of this request is appreciated.

Sincerely,

K. MAURICE JOHANNESSEN

KMJ/mjr

☐ STATE CAPITOL
SACRAMENTO, CA 95814
(916) 445-3553
(916) 445-7758 - FAX

☐ 410 HEMSTED DRIVE, SUITE 200
REDDING, CA 96002
(530) 224-4706
(530) 224-4794 - FAX

☐ 2567 DAVISON COURT, SUITE A-1
COLUSA, CA 95932
(530) 458-4161
(530) 458-4184 - FAX

☐ 1170 NORTH LINCOLN ST. STE 100
DIXON, CA 95620
(707) 678-3106
(707) 678-3158 - FAX

FOURTH SENATE DISTRICT (ACKNOWLEDGING THE COUNTIES OF: COLUSA • GLENN • SHASTA • SISKIYOU • SOLANO (EXCEPT VALLEJO) • SUTTER • TEHAMA • TRINITY • YOLO • PORTIONS OF PLACER AND SACRAMENTO)

The Idaho OnePlan Project

.....A New Approach to Farm Planning.....

Wendy Halverson Martin
CALFED Bay-Delta Program
1416 9th Steet
Sacramento CA 95814

May 15,2000

Re: ***Sustaining Agriculture and Wildlife beyond the Riparian Corridor*** *Proposal*

The Idaho OnePlan has worked with the Yolo Resource Conservation District since 1998 to share successes and valuable products for improving resource conservation planning and implementation. As part of a statewide effort to streamline and simplify interactions between government agencies and agricultural producers, the Idaho OnePlan Project is creating Planning Tools to assist fanners and agriculture agencies in identifying water quality and other resource problems and solutions. The OnePlan will establish a mechanism whereby producers, or planners assisting producers, can access information over the Internet, and can utilize decision support tools to develop sound conservation plans that meet all agency requirements. With increasing environmental pressures and new requirements, *it* is becoming increasingly difficult to provide an adequate level of assistance. The OnePlan will help to better meet these new challenges.

Two of the more valuable elements of the Idaho OnePlan project are the automated planning tools and electronic access of information. Conservation and Nufrient Management Planning Tools are currently under development Both of these tools utilize a GIS interface as the front end. Producers will locate their farming operation(s) over the Internet and will download 'clipped" farm level imagery and other data, as well as the planning tools. The GIS interface will then fill-in associated input fields residing in the Conservation and/or Nufrient Management Planning Tool with relevant geographic data for *the* areas specified. These tools will be run on the Producer's own computer and will allow a smooth transition to the Internet interface.

As part of an ongoing partnership, the Idaho OnePlan will assist the Yolo RCD in the development of a Yolo OnePlan. Planning tools developed by the Idaho OnePlan can be easily transported to the Yolo OnePlan and made functional once the necessary local databases are created. The Idaho OnePlan has agreed to assist in this transition. Please consider this proposal for funding, as it will help to streamline conservation planning within the Union School Slough Watershed. In addition, it will help *to* establish an agricultural implementation process that will assist in meeting resource protection goals statewide. Thank you greatly for your consideration.

Sincerely,

James L. Wood

Jim Wood, Co-Chair
Idaho OnePlan Steering Committee

STATE OF CALIFORNIA

NONDISCRIMINATION COMPLIANCE STATEMENT

STD. 19 (REV. 3-95)

COMPANY NAME: Yolo County Resource Conservation District

The company named above (herinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division **4,** Chapter **5** in matters relating to reporting **requirements** and the development, implementation and maintenance of a Nondiscrimination **Program.** Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of **sex,** race, color, ancestry, religious creed, national origin, physical disability (including HIV and **AIDS),** medical condition (cancer), age (over 40), marital **status,** denial **of** family care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME: Kathryn Pye

DATE EXECUTED: 5/15/2000

EXECUTED IN THE COUNTY OF: Yolo, CA

PROSPECTIVE CONTRACTOR'S SIGNATURE: Kathryn Pye

PROSPECTIVE CONTRACTOR'S TITLE: Executive Director, Yolo Co. RCD

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME: Yolo County Resource Conservation District

Environmental Compliance Checklist

1. **Do** any of the actions included in the proposal require compliance with either the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), or both?

____	X
YES	NO

2. If you answered yes to # **1,** identify the lead governmental agency for CEQA/NEPA compliance. (No to #1)

_____
Lead Agency

3. If you answered **no** to # **1,** explain why CEQA/ NEPA compliance is not required for the actions in the proposal. It is not anticipated activities proposed as part of the project would be considered discretionary actions by local, state or federal agencies.

4. If CEQA/NEPA compliance is required, describe how the project will comply with either or both of these laws. Describe where the project is in the compliance process and the expected date of completion. It is not anticipated that CEQA/NEPA compliance will be required.

5. Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?

X	____
YES	NO

The RCD will require access across private property that we do not own to accomplish the activities in the proposal, Because individual properties where project activities will be implemented have not yet been identified, the RCD will provide access needs and permission for access from individual private landowners within 30 days of notification of approval.

6. Please indicate what permits or other approvals may be required for the activities contained in your proposal. Check all boxes that apply.

LOCAL
Conditional use permit ___
Variance ___
Subdivision Map Act approval ___
Grading permit ___
General plan amendment ___
Specific plan approval ___
Rezone ___
Williamson Act Contract cancellation ___
Other _____
(please specify)
None required X

STATE
CESA Compliance ___ (CDFG)
Streambed alteration permit X unlikely (CDFG)

CWA § 401 certification ___ (RWQCB)
Coastal development permit ___ (Coastal Commission/BCDC)
Reclamation Board approval ___
Notification ___ (DPC, BCDC)
Other _____
(please specify)
None required ___

FEDERAL

ESA Consultation ___ (USFWS)
Rivers & Harbors Act permit ___ (ACOE)
CWA § *404* permit ___ (ACOE)
Other _____
(please specify)
None required **X**

DPC = Delta Protection Commission
CWA = Clean Water Act ESA = Endangered Species Act
CESA = California Endangered Species Act CDFG =California Department of Fish and Game
USFWS = **U.S.** Fish and Wildlife Service RWQCB = Regional Water Quality Control Board
ACOE = U.S. A m y Corps of Engineers BCDC= Bay Conservation and Development Comm.

Land Use Checklist

1. **Do** the actions in the proposal involve physical changes to the land (i.e. grading, planting vegetation, or breaching levees) or restrictions in land use (i. e. conservation easement or placement of land in a wildlife refuge)?

X
YES _____ NO

2. If **NO** to # 1, explain what type of actions are involved in the proposal (i.e., research only, planning only). (no to # 1)

3. **If YES** to # **1,** what is the proposed land use change or restriction under the proposal? The project will not require land use changes or restrictions. Physical changes to the land (i.e. digging ponds, removing weedy vegetation, planting vegetation) are compatible with current private agricultural land uses.

4. If YES to # **1,** is the land currently under a Williamson Act contract?

X (mostly)
YES _____ NO

As new landowers join the program, this information will be made available to CALFED. However, the project poses no impact to Williamson Act status.

5. If YES **to # 1,** answer the following:

Current land use: Agricultural crop land
Current zoning: Agriculture Preserve (A-P) and General Agriculture (A-1)
Current general plan designation: Agriculture

6. If YES **to #1, is** the land classified as Prime Farmland, Farmland of Statewide Importance or Unique Farm land **on** the Department **of** Conservation Important Farmland **Maps?**

X (70%)
YES _____ NO , _____ DON'T KNOW

7. If YES **to** # **1,** how many acres **of** land will be subject to physical change or land use restrictions under the proposal? All project areas in the watershed that will be subject to physical change (i.e. digging ponds, removing weedy vegetation, planting vegetation) have not been identified. However, projects will be compatible with current private agricultural land uses, and will not require land use restrictions.

8. If YES **to** # **1,** is the property currently being commercially farmed or grazed?

X
YES _____ NO

9. **If YES** to **#8,** what are the number of employees/acre? Because individual private properties where project activities will be implemented within the watershed have not yet been identified, we cannot provide an accurate response to this question. The total number of employees? Again, because individual private properties where project activities will be implemented within the watershed have not yet been identified, we cannot providean accurate response to this question.

10. Will the applicant acquire any interest in land under the proposal (fee title or a conservation easement)?

_____ YES X NO

11. What entity/organization will hold the interest? Private landowners would continue to hold the interest in their property.

12. If YES to # **10,** answer the following: (No to # 10)
Total number of acres to be acquired under proposal _____
Number of acres to be acquired in fee _____
Number of acres to be subject to conservation easement _____

13. For all proposals involving physical changes to the land or restriction in land use, describe what entity or organization will:

manage the property: Private landowners would continue to manage their property. However, the RCD will coordinate with landowners on management of individual project sites.
provide operations and maintenance services: Private landowners would provide operations and maintenance services for project on their property.
conduct monitoring: The RCD and other collaborating agencies and organizations will conduct monitoring with approval and participation by the private landowner.

14. For land acquisitions (fee title or easements), will existing water rights also be acquired? (No land acquisition is proposed)

_____ YES _____ NO

15. Does the applicant propose any modifications to the water right or change in the delivery of the water?

_____ YES X NO

16. If YES to # 15, describe: (no to #15)

Yolo County Resource Conservation District
221 W. Court St., Suite 1 . Woodland, **CA 95695**
Phone (916) 662-2037 (916) 662-8761 FAX

May 13,2000

Losi Wolk, Chairman
Yolo County Board of Supervisors
625 Court St.
Woodland, CA. 95695

It is with great pleasure we advise you that the Yolo County RCD (Resource Conservation District) is submitting a three-year proposal to CALFED entitled, "Sustaining Agriculture and the Environment Beyond the Riparian Corridor."

This project is a second-phase request within our collaborative partnership with Audubon Society-Californiaas part of their existing CALFED project, "Union School Slough Watershed Improvement Program," now in its second year. The project includes new partners, USDA: Agricultural Research Service, UCD's Center for Watershed Integrated Watershed Science and Management, the Information Center for the Environment (ICE), and Agronomy and Range UC Cooperative Extension. Each brings to the project scientific evaluation skills to cover task assignments, large and small.

All requested funds are for direct implementation of the Willow Slough Integrated Resource Management Plan (which the county helped fund in 1996), to assist landowners with conservation planning, and to locate even additional cost-sharing, and process permits. The project will continue and expand projects already begun under previous RCD grants. as well. We intend to further validate, through scientific inquiry, and promote field-tested, flexible water quality and restoration programs, plus providing regional and area-wide models for co-operation, information transfer, technical and monitoring precision, and outreach to stakeholders. Already the proposal enjoys the support of the Yolo County Farm Bureau, Yolo County Flood Control and Water Conservation District, Yolo County Department of Planning and Public Works, Assemblymembers Helen Thomson and Dick Dickerson, Senators Maurice Johannesson and Doug Ose (pending, due to legislative time constraints), USDA: NRCS State Office Staff, State Water Resources Control Board, Region 5 - CRWQCB, and a list of enthusiastic landowners who are ready to put conservation measures on their farms and ranches.

A copy **ofthe** proposal is attached for your files and is available on the web on CALFED's site: http://www.calfed.water.ca.gov/.

We look forward to sharing more about the project with you upon its **being** funded.

Yours truly,

Katy Pye

Katy Pye,
Executive Director

Yolo County Resource Conservation District

221 W. Court St, Suite 1 . Woodland, CA 95695
Phone (916) 662-2037 (916) 662-4876 FAX

May 13,2000

Lois Wolk, Chairman
Yolo County Board of Supervisors
625 Court St
Woodland CA 95695

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We look forward to sharing more about the project with you **upon** its being funded.

Yours truly,

Katy Pye

Katy Pye,
Executive Director

✓ Cc: Clerk of the Board
John Bencomo, Director-YC Planning & Public Works

STATE OF CALIFORNIA

NONDISCRIMINATION COMPLIANCE STATEMENT

STD. 19 (REV. 9-95)

COMPANY NAME: U.S.D.A. - Agriculture Reseach Service

The company named above (herinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), medical condition (cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME: Dr. Stephen M. Griffith

DATE EXECUTED: 8 May 2000

EXECUTED IN THE COUNTY OF:

PROSPECTIVE CONTRACTOR'S SIGNATURE:

PROSPECTIVE CONTRACTOR'S TITLE:

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME:

Environmental Compliance Checklist

1. Do any of the actions included in the proposal require compliance with either the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), or both?

____	X
YES	NO

2. If you answered yes to # 1, identify the lead governmental agency for **CEQA/NEPA** compliance. (No *to* #1)

_____
Lead Agency

3. If you answered no to # 1, explain why CEQA/ NEPA compliance is not required for **the** actions in the proposal. It is not anticipated activities proposed as part of the project would be considered discretionary actions by local, state or federal agencies.

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5. Will the applicant require access across public or private property that the applicant **does** not own to accomplish the activities in the proposal?

X	____
YES	NO

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6. Please indicate what permits ***or*** other approvals may be required for the activities contained in your proposal. Check all boxes that apply.

LOCAL

Conditional use permit ___
Variance ___
Subdivision Map Act approval ___
Grading permit ___
General plan amendment ___
Specific plan approval ___
Rezone ___
Williamson Act Contract cancellation ___
Other _____
(please specify)
None required X

STATE

CESA Compliance ___ (CDFG)
Streambed alteration permit X unlikely (CDFG)

CWA § 401 certification ___ (RWQCB)
Coastal development permit ___ (Coastal Commission/BCDC)
Reclamation Board approval ___
Notification ___ (DPC, BCDC)
Other _____
(please specify)
None required ___

FEDERAL

ESA Consultation ___ (USFWS)
Rivers & Harbors Act permit ___ (ACOE)
CWA § 404 permit ___ (ACOE)
Other _____
(please specify)
None required **X**

DPC = Delta Protection Commission
CWA = Clean Water Act ESA = Endangered Species Act
CESA = California Endangered Species Act CDFG = California Department of Fish and Game
USFWS = U.S. Fish and Wildlife Service RWQCB = Regional Water Quality Control Board
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Land Use Checklist

1. Do the actions in the proposal involve physical changes to the land (i.e. grading, planting vegetation, or breaching levees) or restrictions in land use **(i.** e. conservation easement or placement of land in a wildlife refuge)?

X
YES NO

2. If **NO** to X 1, explain what type of actions are involved in the proposal (i.e., research only, planning **only).** (no to # 1)

3. If YES to X 1, what is the proposed land use change or restriction under the proposal? The project will not require land use changes or restrictions. Physical changes to the land (i.e. digging ponds, removing weedy vegetation, planting vegetation) are compatible with current private agricultural land uses.

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X (mostly)
YES NO

As new landowers join the program, this information will be made available to CALFED. However, the project poses no impact to Williamson Act status.

5. If YES to # 1, answer the following:

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Current zoning.:Agriculture Preserve (A-P) and General Agriculture (A-1)
Current general plan designation: Agriculture

6. If YES to #1, is the land classified as Prime Farmland, Farmland *of* Statewide Importance or Unique Farm land on the Department of Conservation Important Farmland **Maps?**

X (70%)
YES NO DON'T KNOW

7. If **YES** to # **1,** how many acres of land will be subject to physical change or **land** use restrictions under the proposal? **All** project areas in the watershed that will be subject to physical change (i.e. digging ponds: removing weedy vegetation, planting vegetation) have not been identified. However, projects will be compatible with current private agricultural land uses, and will not require land use restrictions.

8. If **YES** to # 1, **is** the property currently being commercially farmed or grazed?

X
YES NO

9. If YES to #8, what are the number of employees/acre? Because individual private properties where project activities will be implemented within the watershed have not yet been identified, we cannot provide an accurate response to this question. **The total number of employees?** Again, because individual private properties where project activities will be implemented within the watershed have not yet been identified, we cannot provide an accurate response to this question.

10. Will the applicant acquire any interest in land under the proposal (fee title or a conservation easement)?

X
YES NO

11. What entity/organization will **hold** the interest? Private landowners would continue to hold the interest in their propeny.

12. If ***YES*** to # 10, answer the following: (No to # 10)
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Number of acres to be acquired in fee _____
Number of acres to be subject to conservation easement _____

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conduct monitoring: The RCD and other collaborating agencies and organizations will conduct monitoring with approval and participation by the private landowner.

14. For land acquisitions (fee title or easements), will existing water rights also be acquired? (No land acquisition is proposed)

_____ YES **NO**

15. Does the applicant propose any modifications to the water right or change in the delivery of the water?

_____ YES X NO

16. **If YES** to # 15, describe: (no to #15)

APPLICATION FOR FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

2. DATE SUBMITTED	Applicant Identifier
May 15, 2000	
3. DATE RECEIVED BY STATE	State Application Identifier
4. DATE RECEIVED BY FEDERAL AGENCY	(Federal identifier

1. TYPE OF SUBMISSION:

Application: ☐ Construction ☒ Non-Construction

Preapplication: ☐ Construction ☐ Non-Construction

5. APPLICANT INFORMATION

Legal Name: Yolo County Resource Conservation District

Organizational Unit:

Address (give city. county, State. *and zip* code):
221 West Court St., #1
Woodland. CA 95695

Name and telephone number of person to be contacted on matters involvir this application (give *area* code)
Katy Pye, (530)662-2037, x3

6. EMPLOYER IDENTIFICATION NUMBER *(EIN):* 94 — 6001054 8

7. TYPE OF APPLICANT (enter appropriate *letter* in *box)* G

A. State
B. County
C. Municipal
D. Township
E. interstate
F. Intermunicipal
G. Special District
H. Independent School Dist.
I. State Controlled Institution of Higher Learning
J. Private University
K. Indian Tribe
L. Individual
M. Profit Organization
N. Other (Specify)

8. TYPE OF APPLICATION:

☒ New ☐ Continuation ☐ Revision

f Revision, enter appropriate letter(s) in box(es) ☐ ☐

A. Increase Award B. Decrease Award C. Increase Duration
O. Decrease Duration Other *(specify):*

9. NAME OF FEDERAL AGENCY

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER

xx — xxx

TITLE: CALFED Bay-Delta Program

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT

Water Quality and Wildlife Habitat Conservation Pilot/Demonstration/ Education Program in Union School Watershed, Yolo County, CA

12. AREAS AFFECTED BY PROJECT *(Cities, Counties, States, etc.):*

Yolo County, CA

13. PROPOSED PROJECT

Start Date: 2001 Ending Date: 2004

14. CONGRESSIONAL DISTRICTS OF:

a. Applicant: Congressional District 3

b. Project: "Sustaining Agriculture & Wildlife Beyond the Riparian Corridor"

15. ESTIMATED FUNDING:

a. Federal	$ 1,464,167.00
b. Applicant	$ 198,000.00
c. state	$ 16,800.00
d. Local	$ 95,000.00
e. Other in-kind Fed & Idaho	$ 2,011,480.00
f. Program Income	$
g. TOTAL	$ 3,785,447.00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES, THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE _____

b. No. ☐ PROGRAM IS NOT COVERED BY E. O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

☐ Yes If "Yes." attach an explanation. ☐ No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

a. Type Name of Authorized Representative	b. Title	c. Telephone Number
Kathryn Pye	Executive Director	(530)662-2037, x3
d. Signature of Authorized Representative		e. Date Signed 5/15/2000

Previous Edition Usable
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Standard Form 424 (Rev. 7-97)
Prescribed by OMB Circular A-102

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. CALFEO Bay-Delta Prog.		$ -	$ -	$ 1,464,167.00	$ 309,800.00	$ 1,773,967.00
2.						
3.						
4.						
5. Totals		$	$	$ 1,464,167.00	$ 309,800.00	$ 1,773,967.00

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
a. Personnel	$ 692,952	$	$	$	$
b. Frinae Benefits	111,013				
c. Travel	18,000				
d. Equipment	88,000				
e. Supplies	27,675				
f. Contractual	371,945				
g. Construction					
h. Other					
i. Total Direct Charges *(sum of 6a-6h)*	1,342,413				
j. Indirect Charges	121,754				
k. TOTALS *(sum of 6i and 6j)*	$ 1,464,167	$	$	$	$
7. Program Income	$ -	$	$	$	$

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Previous Edition Usable

SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8. CALFED Bay-Delta Program	$ 198,000	$ 16,800	$ 95,000	$ 309,800
9.				
10				
11				
12. TOTAL (sum *of lines 8-17)*	$ 198,000	$ 16,800	$ 95,000	$ 309,800

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 566,516	$ 207,629	$ 124,629	$ 117,629	$ 117,629
14. Non-Federal	103,800	50,000	17,934	17,933	17,933
15 TOTAL *(sum of lines 13 and 14)*	$ 670,316	$ 257,629	$ 142,563	$ 135,062	$ 135,062

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (Years) (b) First	(c) Second	(d) Third	(e) Fourth
16. CALFED Bay Delta Program	$ 420,488	$ 477,164	$	$
17.				
18.				
19.				
20. TOTAL *(sum of lines 16-79)*	$ 420,488	$ 477,164	$	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:

22. Indirect Charges: Overhead is a fixed 10% Rate

23. Remarks:

OMB Approval No. 0348-0040

ASSURANCES - NON-CONSTRUCTION PROGRAMS

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federai assistance and the institutional, manageriai and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper pianning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit empioyees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will compiy with the Intergovernmental Personnel Act of 1970 (42 U.S.C. $947284763) reiating to prescribed standards for merit systems for programs funded under one of the 19 statutes or reguiations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Wiii comply with all Federai statutes reiating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin: (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps: (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse: (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3). as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles ii and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons dispiaced or whose property is acquired as a result of Federai or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable. with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply. as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmentai standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant *to* EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988: (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, **as** amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523): and. (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching. or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133. "Audits of States, Local Governments, and Non-Profit Organizations."

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
	Executive Director
APPLICANT ORGANIZATION	DATE SUBMITTED
Yolo County Resource Conservation District	May 15, 2000